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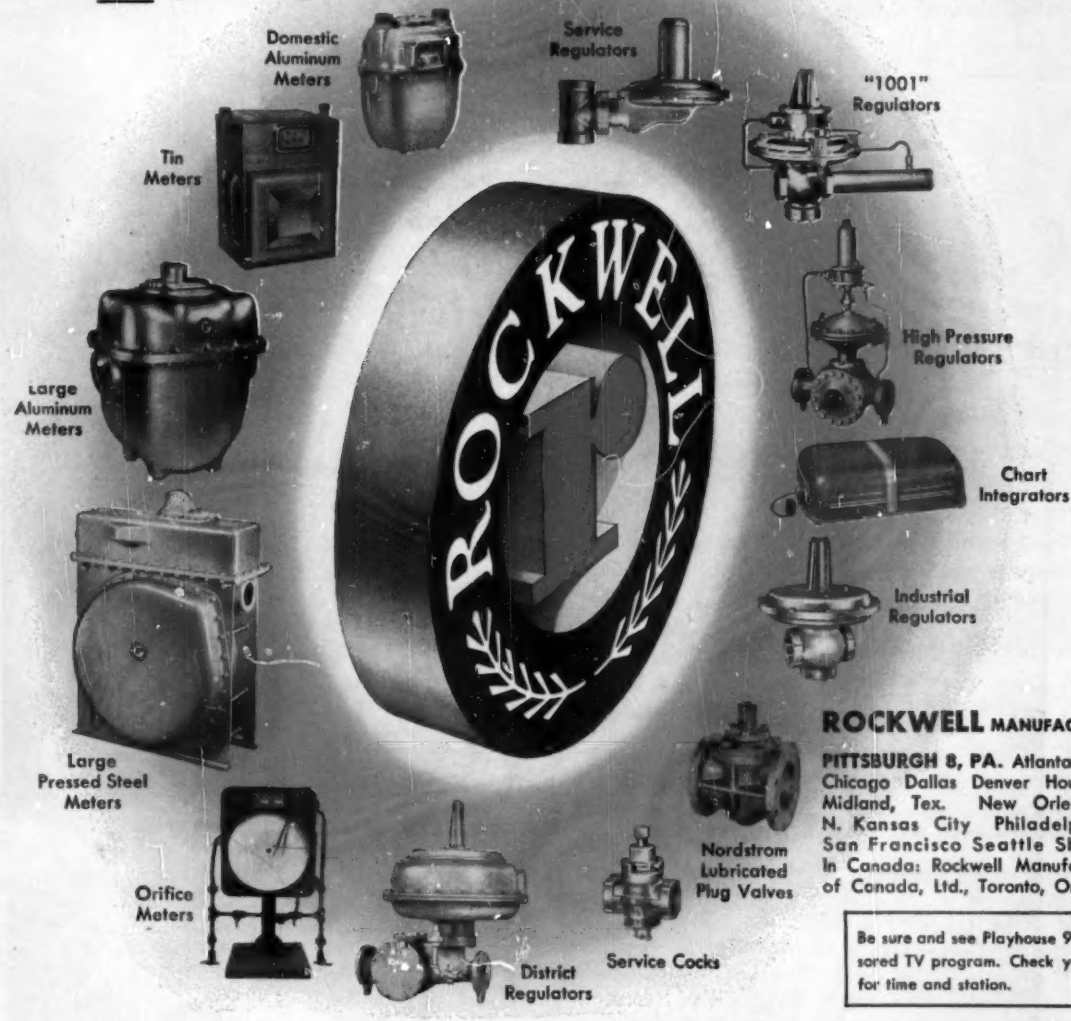

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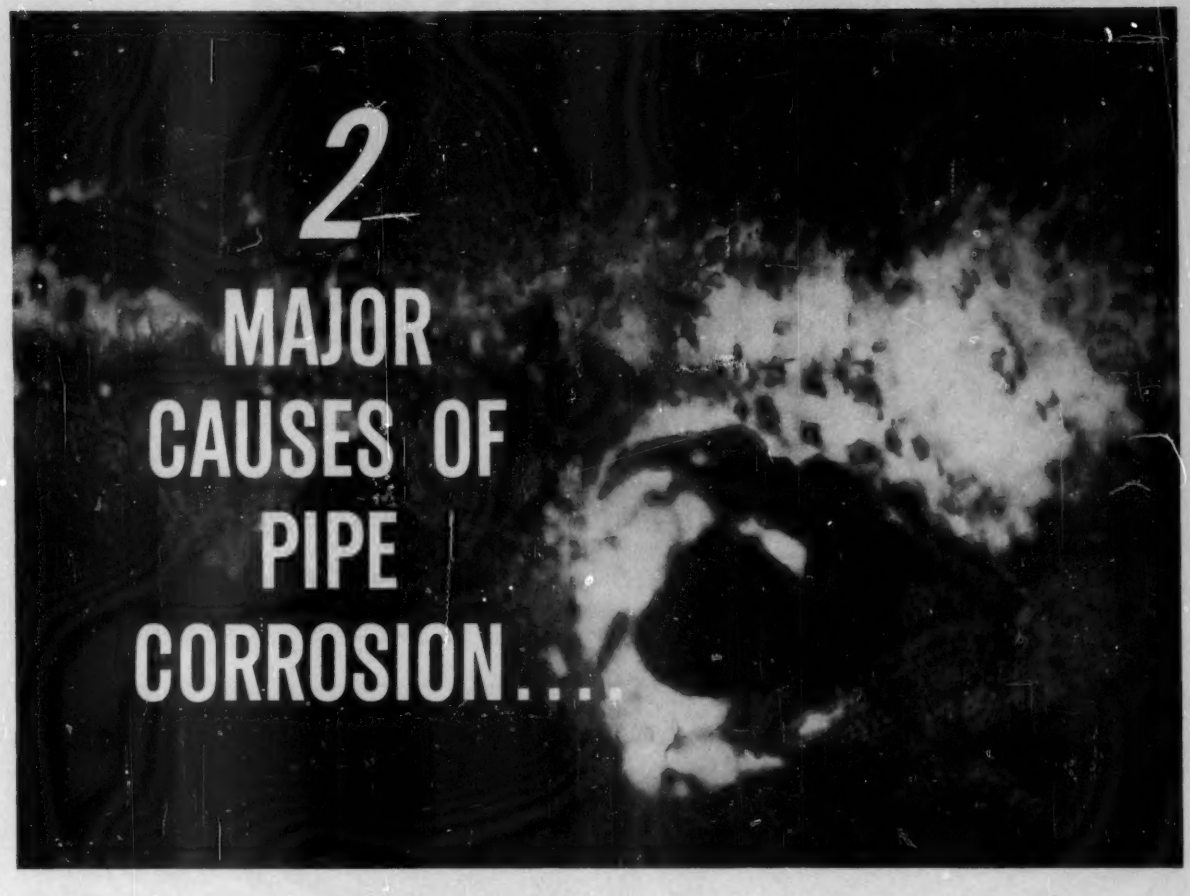

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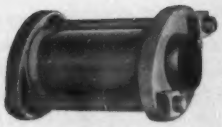
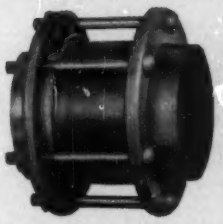


1¼" ID Style 39, showing two-bolt construction, supplied in sizes thru 2".



6" ID Style 39, showing construction supplied for this size. Note insulating gasket.

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JANUARY 1958

Thermally Thinking

Consumers, businessmen and investors have been increasingly uncertain about 1958. The stock market reflects this uncertainty—which is a nice way of saying the market has looked better.

My total background in economics is based on a tussle with the Keynesian theory of economic analysis during a course in petroleum economics I stumbled through at the University of Texas. Frankly, I was more concerned with checks from home, so never did really understand what it was all about. However, I did grasp the basic principle—keep money in circulation. This I have managed to do. I can point with pride at my record of applying the Keynesian theory to numerous expense accounts.

This year is going to mean a lot to the gas industry in terms of years to come. For one thing, it is the time to build for the future. The future looks awfully good. Recent scientific studies prove that: (1) the total U. S. population is increasing rapidly, (2) the number of single-family dwelling units is also increasing fast, and (3) more new families than ever are coming on the scene.

The latter fact is specially important. Experts tell us that the tremendous "crop" of children from the World War II era will be of age to fly from the nest during years 1959-65. This means establishment of new family units. And new family units in numbers never before experienced in these United States are forecast.

Having already flown from the nest, I do not need the experts to tell me what this means. These new families will have to have places to live, and all the associated goods and services. Inevitably, the size of the new family units will increase. This results in demand for even more goods and services.

Now my family unit started out in a garage apartment. However, young newly married people of today feel that a new home of their own is the ideal place to start this adventure. I agree, and wish more power to them. Our way of life produces ways to make it pretty easy for them to start out with some kind of new home. The gas industry must make sure that these family units are given the added blessings of an all-gas new home.

All economic services and studies say there will be more new home starts in 1958 than in 1957. Perhaps this is the initial phase of the predicted flood of new dwelling unit construction that will be expected for 1959-65.

Again, now is the time to get ready for this big-growth period. Our gas industry must exert every resource available to assure that the public is sold on the modernity and efficiency of gas appliances and gas service. All the gas system expansion in the world will not mean a thing if new family units, circa '59-to-'65 and others, do not appreciate the real advantages modern gas appliances bring to their homes. We must catch these future homemakers in their current homes, in their high schools, and in the colleges. Tell, sell, and demonstrate for the future without, of course, neglecting the present market and potential consumers.

Simultaneously, our industry must study the areas and paths of this population-new family growth. A gas utility serving any particular city should have a very good idea of if and when this city will grow between now and 1970. Studies should have revealed the expected areas for accelerated growth and the direction this development will take.

Planning is the key to continued, healthy gas industry growth. Be assured from the reflection of our country's past; keep the fingers away from the panic-button; and keep sharp eyes to the future. An industry that stands still actually goes backward.

J. Fred Ebsen

EDITOR

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GAS HIGHLIGHTS

Houston-Coastal gets go-ahead

Houston-Coastal pipeline project is ready to roll. A U. S. District Court of Appeals in Washington turned down a petition by Florida fuel oil dealers and barge operators to block the line.

Pipelines seek St. Louis market

Two new companies are eyeing the St. Louis gas market. Mookl Chemical & Gas Corp. (Tulsa) and Missouri Transmission Corp. (Springfield, Mo.) want to build a 425-mile, 16-in. line from the Oklahoma City area to St. Louis. Mookl says it has firm contracts from eastern Oklahoma producers. Mississippi River Fuel Corp. is now the sole supplier of St. Louis.

Export okay sought in Alberta

Westcoast Transmission and El Paso Natural are seeking Canadian approval to pipe Alberta gas to California. This is the first export request made since Prime Minister Diefenbaker appointed a commission to set a definite export policy. Westcoast-El Paso want to transport gas from Savanna Creek and East Calgary fields to southern California. New 700 mile line would connect gas fields with Pacific Northwest pipeline (El Paso subsidiary) in Idaho. A 511-mile El Paso line from Twin Falls, Idaho, would take it to California. Plan is now before Alberta Conservation Board. Opposing it is Alberta & Southern Gas Co., Ltd., a Pacific Gas & Electric Co. subsidiary. PG&E, through subsidiaries, also wants to build Canada-to-California line.

Off-shore drilling set for Lake Erie

New York State Natural Gas Corp. is exploring in Lake Erie. It has off-shore drilling rights from State of Pennsylvania for 36,000 acres. Drilling will begin when ice melts in the spring.

'58 gas construction to top $2 billion

The U. S. gas industry will continue its booming expansion in 1958. Departments of Commerce and Labor experts predict expenditure of $2 billion by year's end. Same experts also say all U. S. industry will spend $49.6 billion on construction this year—up 5 per cent over 1957. Estimates don't cover Canada, where gas industry is in midst of tremendous growth.

Carnegie to build mammoth pipelines

Biggest pipeline in gas industry will be built by Carnegie Natural Gas Corp. The U. S. Steel subsidiary will lay 8.5 miles of parallel 55⅜-in. OD pipe and 4.5 miles of 43¼-in. The system will carry 225 MMcf/day of coke oven gas to six U. S. Steel plants in Pittsburgh area. Work will start in May.

El Paso plans Utah expansion

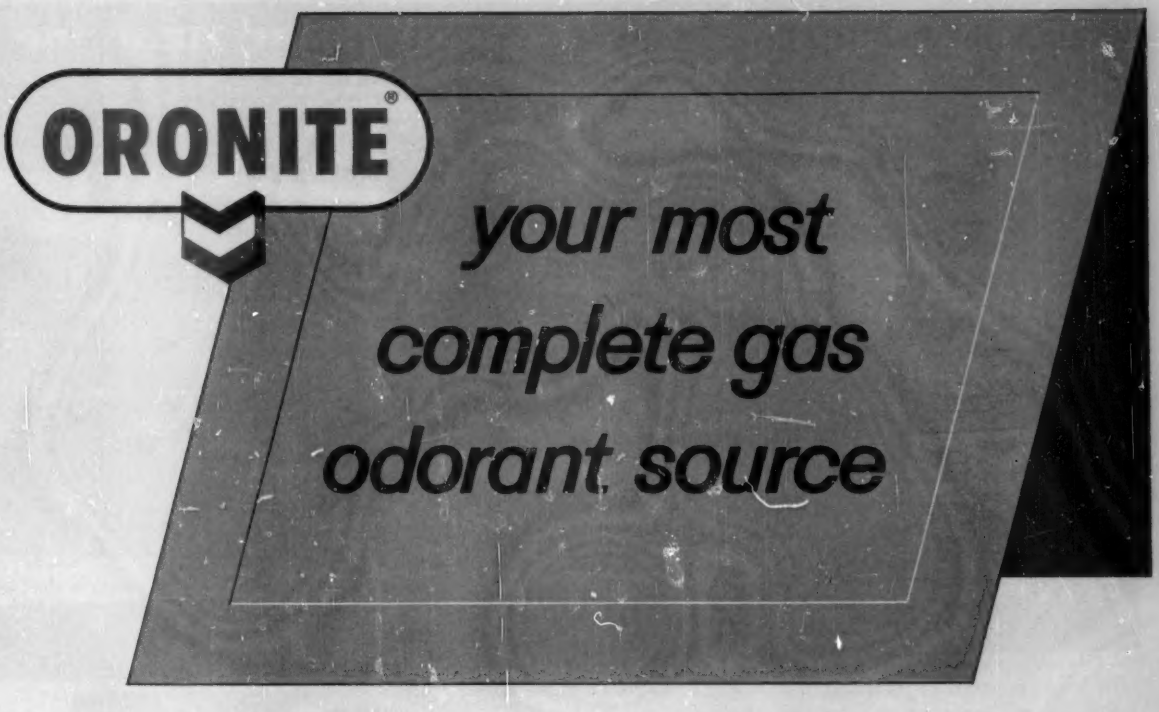
El Paso Natural Gas plans a $26 million pipeline and expansion project. If FPC approves, a new line would be built from Desert Creek in Utah's San Juan county to southern California.

Industrial sales top billion mark

Industrial gas sales topped the $1 billion mark for the first time in 1956. GAMA says this is an 11-fold increase over 1932. Industrial customers in same period rose from 22,000 to 108,000.

Solon blasts gas imports

Newest opponent to importation of Canadian gas: Rep. Robert C. Byrd of West Virginia. His claim: imported gas would hurt Midwest coal market. In turn, West Virginia coal miners and railroaders would suffer.



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Regulatory and Legislative Trends

A COMMENTARY ON NATIONAL AND STATE DEVELOPMENTS BY AN EXPERT IN UTILITY LAW

THE Hope Natural Gas decision in 1944 by the United States Supreme Court gave utility regulatory commissions new freedom, which they have been eager to use. The court ruled that a commission is not bound "to the use of any single formula or combination of formulae in determining rates. Its rate-making function, moreover, involves the making of pragmatic adjustments. * * * It is the result reached, not the method employed, which is controlling."

Even with this broad discretion possessed by public utility regulatory bodies, and their recognized expertness in a specialized field, courts still guard utility rights. Gas company managers will be glad to know that a state supreme court recently did just that by reversing a regulatory commission's rate decision, because there was no evidence to support an important finding made by the commission.

Fair Hearing

The highest court in the land has admonished all utility commissions to conduct proper hearings. That court asserted that the right to a fair and open hearing is one of the "rudiments of fair play" assured to every litigant by the United States Constitution. Due process of law requires that commissions proceed upon evidence and base their findings, not upon whim, but upon substantial and competent evidence. As the Supreme Court of the United States has declared, "There can be no compromise on the footing of convenience or expediency, or because of a natural desire to be rid of harassing delay" when that minimal requirement of a fair hearing has been neglected.

Administrative tribunals, like utility regulatory commissions, cannot act upon their own knowledge, and nothing can be considered as evidence that was not introduced at a public hearing under all of the rules safeguarding the rights of the participants. A fair hearing requires that a person be informed about the evidence against him so that he may test it by cross-examination, explain it, or refute it. All the more insistent is the need for a fair hearing before public utility commissions, because they have broad powers and their informed and expert judgment receives proper deference from reviewing courts.

Utility commission erred

Now we shall consider the state supreme court's heartening decision in a rate case. The gas company sought a rate increase of $2,283,000 for its state business as contrasted with its interstate operations. The state commission allowed $581,000. The gas company appealed to the court claiming that the utility commission erred, because (1) the rate decision had no evidence to support it and was contrary to the evidence; (2) the order burdens interstate commerce by giving consumers in one state an unlawful preference over the company's gas consumers in other states; and (3) it results in confiscation of the utility's property without just compensation in violation of the State and Federal Constitutions.

Since 1944 the gas company has been unable to supply its markets from local gas reserves, and has imported large volumes from states in the Southwest. Currently the utility is receiving more than 70 per cent of its total supply from the Southwest and continues to purchase local gas in West Virginia and Kentucky.

The price paid for the interstate gas from the Southwest is fixed by the Federal Power Commission and for the test year it was 28 cents per Mcf compared with 23 cents for local gas.

More than 85 per cent of the entire business of the gas company involved in this state rate case consists of interstate sales. The growth of the company has been typical, increasing from $86 million in 1946 to $152 million invested in facilities in the test year.

It is generally recognized that the most economical distribution of natural gas takes place when it is made at a uniform rate throughout the year. Also utilities can purchase gas economically by taking large volumes without material fluctuations annually. Weather conditions, which affect the amount of gas needed for heating, cause wide seasonal variations in residential and commercial sales. To meet these fluctuations and to give higher utilization to facilities, the gas company has industrial customers subject to curtailment for firm customers, and has large underground gas storage. This arrangement enables the utility to purchase Southwest gas in interstate commerce in comparatively uniform volumes each month. Local gas and interstate gas are stored together in underground reservoirs.

The disputes in the rate case surrounded the gas company's contention that the state commission made erroneous findings without evidence. The challenged commission's findings are that local consumers are supplied only with state gas and that the allocation of costs to local gas consumers was equitable.

The state commission concluded that gas customers in West Virginia should pay the cost for local gas which they use rather than the company's cost of gas from Texas supplied to customers in other states. The commission held the opinion that the utility had a local gas supply adequate

to meet requirements of consumers in the state and that such ratepayers should not be assessed even the cost of commingled local and imported gas. The court concluded that there was not sufficient evidence to sustain the commission's findings, and therefore reversed the public utility commission's decision.

Judicial review and conclusions

The reviewing court made this searching analysis of the natural gas rate case:

"Neither the finding of the commission that the West Virginia customers actually consume only gas produced in West Virginia nor the finding that the rates charged its West Virginia customers for the gas consumed by them should be based upon the cost of gas produced in West Virginia is supported by the facts established by the evidence.

"Though the evidence shows that the amount of the gas actually produced in West Virginia is more than twice the amount of the gas consumed by the West Virginia customers of the petitioner, the evidence also shows without question that the total supply of West Virginia gas, or enough of it to meet the requirements of its West Virginia customers, cannot be economically or practically delivered by the petitioner to those customers in the proper operation of its system as originally located and constructed and as maintained and operated during the test period. As already indicated, in the development of its system and the construction and maintenance of its transmission and distribution facilities the petitioner originally located, and still maintains on their original location, transmission lines to serve its interstate customers at various distribution centers to comply with its valid contractual obligations. More than one-half of the gas produced in West Virginia can be transported and delivered only by those interstate transmission lines. Because of the lower pressure at the West Virginia wells, as compared with the higher pressure at which the southwest gas is produced, only a relatively small part of the West Virginia gas can be delivered and placed in underground storage and because of the present location of the transmission lines through which the gas produced in West Virginia must pass, all of it, or even enough of it to satisfy the consumption requirements of its West Virginia consumers, cannot be delivered to those customers by the petitioner.

"There is no suggestion by the commission or by any interested party that the construction and maintenance of its transmission lines as originally and presently located resulted from faulty management or management conducted in bad faith, or from any inefficient, unreasonable, extravagant, or wasteful managerial policies or practices upon the part of the petitioner. On the contrary it clearly appears that the construction and the subsequent maintenance of its transmission lines upon their original location for many years were effectuated by the petitioner to enable it to serve efficiently legitimate markets in various areas in other states and not for the purpose of depriving its West Virginia consumers of a full supply of the gas produced in this state.

"To enable the petitioner to supply all of the consumption requirements of its West Virginia consumers with West Virginia-produced gas it would be necessary for the petitioner to change the location of its transmission lines or to construct new pipelines and other facilities to place the gas produced in West Virginia in storage to meet the winter requirements of its consumers. To change the location of the lines which transport the West Virginia gas to its customers in other states, from their original location where they have been maintained for many years, or to construct new transmission lines to distribution points at which the gas produced in West Virginia could be delivered to West Virginia customers, would necessarily substantially increase the cost of production of West Virginia gas; and, although no witness has suggested that the transmission lines through which West Virginia-produced gas passes should be relocated or has estimated the cost of changing their location, or of constructing the necessary new facilities, to enable the petitioner to deliver all of the gas produced in West Virginia to its West Virginia consumers, it is clear that any such rearrangement of the transmission system as now located and maintained would increase the cost of production of West Virginia gas to a point which would substantially exceed the cost of southwest gas and would ultimately necessitate the establishment of a much higher rate to the consumer of the gas produced in West Virginia.

"The commission apparently based its conclusion that the petitioner 'has a supply of local gas adequate to meet its local demands, and does in fact use such gas as its principal supply for local demands,' upon the testimony of the witness Blundon, one of the consultants to the commission and a qualified expert of many years experience in the field of public utility rates, who expressed the opinion that West Virginia consumers were, to the possible extent of 90 per cent, furnished with West Virginia gas by the petitioner. He stated no facts as the basis for his opinion and he admitted that West Virginia gas could not be made available to some of the West Virginia markets and that he had made no detailed study to determine the cost of changing the present facilities of the petitioner or to provide additional facilities to enable it to furnish West Virginia gas to all its West Virginia consumers. His associate, Snyder, also an experienced consultant, testified that he did not think it would be possible to supply West Virginia customers solely with West Virginia gas by the use of existing facilities and that he had made no study of the cost of service to supply West Virginia consumers entirely with West Virginia gas." ■

This article will be concluded in the February issue of GAS.

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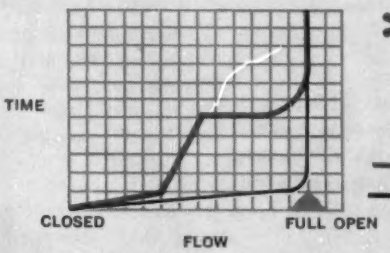

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By GUY CORFIELD

High energy fuels

Much stress has recently been given to high energy fuels as propellants for jets, rockets, missiles and satellites. Derivatives of the metal boron are receiving great attention, and an oil company has even seized upon the development to advertise "boron" gasoline for which super-performance is intimated. The principal and expanding use of these high energy fuels will of course be for jets and missiles, but industry will certainly try to find commercial uses to help defray the experimental and development costs and assure volume consumption. These super-combustibles are of interest to, and may become competitive with conventional fuels for some purposes.

High energy fuels as presently used are burned in a combustion space with a directional outlet so that they produce a thrust as the combustion products escape. They are rated in Specific Impulse (Isp) defines as the pounds of thrust available per pound of propellant (combustible plus oxidizer) per second. A jet thrust propellant with Isp over 250 is considered a high energy fuel. These fuels are, of course, combinations of combustibles that have very high Btu per pound, and oxidizers that promote extremely rapid and efficient combustion.

The combustibles and oxidizers that are currently used are liquids. One or both, of a pair, could be solids. They are usually mixed as used, but some could be premixed. Solids would be more difficult to feed and ignite—for instance, in starting and stopping. They might be more concentrated, however, in terms of energy vs. space and weight. Also it might be more simple to store and carry a solid than, for instance, liquid oxygen that requires a refrigerated pressure tank.

The propellants largely used so far scarcely reach an Isp of 250. Among the best are ethyl alcohol, JP-4 (a hydrocarbon mixture) and turpentine, all combined with liquid oxygen, rated at about 245. Other combustibles are analine ($C_6H_5NH_2$), hydrazine (N_2H_4) and ammonia, and other oxidizers are fuming nitric acid and hydrogen peroxide.

Among liquid combustibles that are being considered is hydrogen, even though extremely low temperature is required for storage. The big interest now is in the boron hydrides such as diborane (B_2H_6) and pentaborane (B_5H_9). They start with what might seem to be a most unlikely material, borax. They are currently difficult to make, and expensive, but very promising. Diborane has a Btu per pound of 32,000 compared to coal, oil—or natural gas—of about 20,000.

One of the most potentially attractive liquid oxidizers is fluorine.

It is also difficult to produce and store but to offset this indications are that the Isp of diborane-fluorine will be 291, and of hydrogen-fluorine 357. Another development is the use of ozone instead of oxygen, because it increases the Isp about 10 per cent. Ozone is made by passing oxygen through an "ozonator" wherein high voltage causes a 2 per cent conversion. It is then separated by refrigeration, as it boils first from the combined liquid. Some interesting research has been done on liquid ozone and ozone-oxygen mixtures. At normal purity there is danger of spontaneous explosion. However at extreme purity, which is possible to produce, ozone can be safely stored and handled.

Research in the field of solid propellants is still almost completely classified. Powdered light metals such as beryllium, boron or lithium seem possibilities. The Btu of beryllium is about 28,000 per pound. The perchlorates are indicated as solid oxidizers as lithium perchlorate, for instance, contains about 60 per cent available oxygen.

The present "state of the art" seems to indicate a top Isp limit of about 400. This may be reduced, or at least delayed, by inability of materials to withstand the high temperatures that are developed. There is some blue sky thinking of harnessing nuclear fission or fusion to do the job.

A super glass

Corning Glass Works has announced the development of a new glass which they call Pyroceram. This name suggests its similarity to a high heat-resistant ceramic as its softening point is 2460°F, above that of copper and some stainless steels. It is said to be stronger and harder than stainless steel, and lighter in weight than aluminum. It has extremely low thermal expansion and high resistance to thermal shock. Forming can be done in a manner similar to regular glass by blowing, drawing, rolling and casting.

It is produced by adding "nucleating agents" to ordinary glass, forming to desired shape, and then heat treating. This causes it to assume a very fine crystalline structure. Commercial production is so far confined to nose pieces for guided missiles, but expectation is to find other fields of use. Cooking vessels, range tops, and other severe-heat-duty appliance sections have already been suggested. The cost is indicated to be more than conventional glass but less than stainless steel. ■

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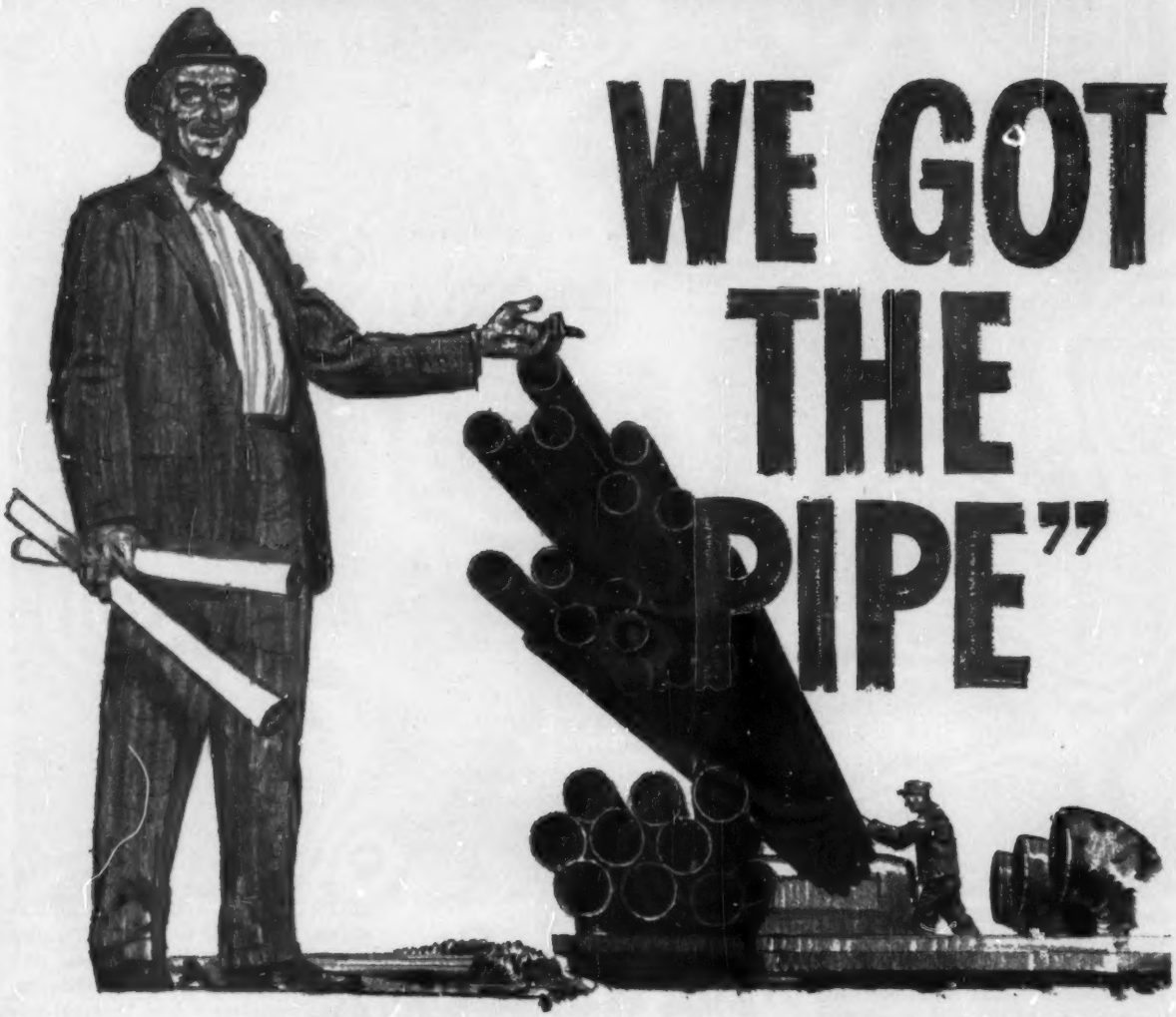

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By NEIL REGEIMBAL
GAS Washington Bureau

FPC approval delays will get longer

GAS distributors sweating out the long waits for Federal Power Commission approval of a new pipeline source or an increase in deliveries might as well figure that conditions will get worse long before they'll get better.

Strictly speaking, the delays in FPC action of certificates for new construction are not entirely the commission's fault. The frustrating delays are a combination of too much work for too little staff, drawn out legal procedures, and the natural bureaucratic delays of government regulatory agencies.

As of June 30, 1956, the commission had 261 applications pending for certificates to construct 10,883 miles of new interstate gas pipeline with a compressor horsepower of 840,000 at a cost of $1131 million. During the previous fiscal year, the commission disposed of 212 construction applications for 8070 miles costing $674,546,000. This includes projects rejected as well as those approved.

Add to that the work load imposed by the Phillips decision of the U. S. Supreme Court. As a result of that order placing independent producers under FPC jurisdiction, the commission through June 30, 1956, had received 7000 applications for certificates from independent producers, disposed of 4332, and in addition, acted on 15,420 rate filings by independent producers.

The figures, however, give little comfort to distributors or anyone else in the gas industry chewing nails waiting for action. As the gas industry becomes more complex and continues to expand, the outlook is that the backlog of cases and the delays will get worse.

The FPC, like all of its sister regulatory agencies in Washington, is admittedly a lawyer's paradise and a businessman's nightmare. Efforts to speed up some of the more complicated proceedings are often made, but usually have little effect as the cumbersome regulatory machinery grinds toward conclusion.

These agencies can work quickly, but don't very often. For instance, in non-contested cases before the FPC, a decision under an "abridged" procedure may come in 60 to 90 days after filing. The average case—if there is one—usually takes about a year. Some of the more complicated and bitterly fought may run from three years to almost indefinitely.

Most promoters of gas projects figure on these delays, and file well in advance of the heating season in which they hope to put in new service. In some cases, these delays have slowed housing projects, or forced builders into using all-electric appliances or competing fuels, particularly easily converted butane-propane.

With a pickup in home construction in the offing, the tendency toward even longer delays may become particularly vexing to distributors.

Government housing experts, figuring conservatively, say home building in 1958 will rise about 6 per cent by dollar volume, hitting $12.8 billion with 1,040,000 new homes being started. Overall construction activity, including construction of stores, industrial plants, and the like, will hit close to $50 billion, an increase of 5 per cent over 1957.

Similarly, expenditures for repair and maintenance will boom. The increase in dollar volume again will be about 6 per cent above the $17.5 billion spent for these purposes in 1957. Of this total, about 40 per cent goes into homes, and the rest into other buildings and other types of construction.

Gas utilities, the government says, spent $150 million on repair and maintenance in 1956, compared with $106 million in 1953 and $60 million in 1947.

These utilities spent $1.8 billion on new construction in 1957, $400 million more than in 1956, and plan to spend about $2 billion for new construction in 1958.

Many housing officials hope that the new easier money policies of the government will send construction—and thus gas utility spending—even higher.

The government, however, is already considering new "far-reaching" changes in the housing laws to further boost home construction. One proposal calls for the FHA to insure the private lender against the loss of the top 20 per cent of a conventional home mortgage. FHA and the builders say this would mean less administrative procedures by the government, permit lower down payments and lower monthly payments, and eliminate "cruel" second mortgages. This program would be on top of the existing FHA mortgage insurance plan.

But the scheme hasn't drawn universal praise. Some congressmen claim it was worked out hurriedly and won't get anywhere in Congress. Home builders and financing agents claim it would step up available home financing by 15 per cent. ■

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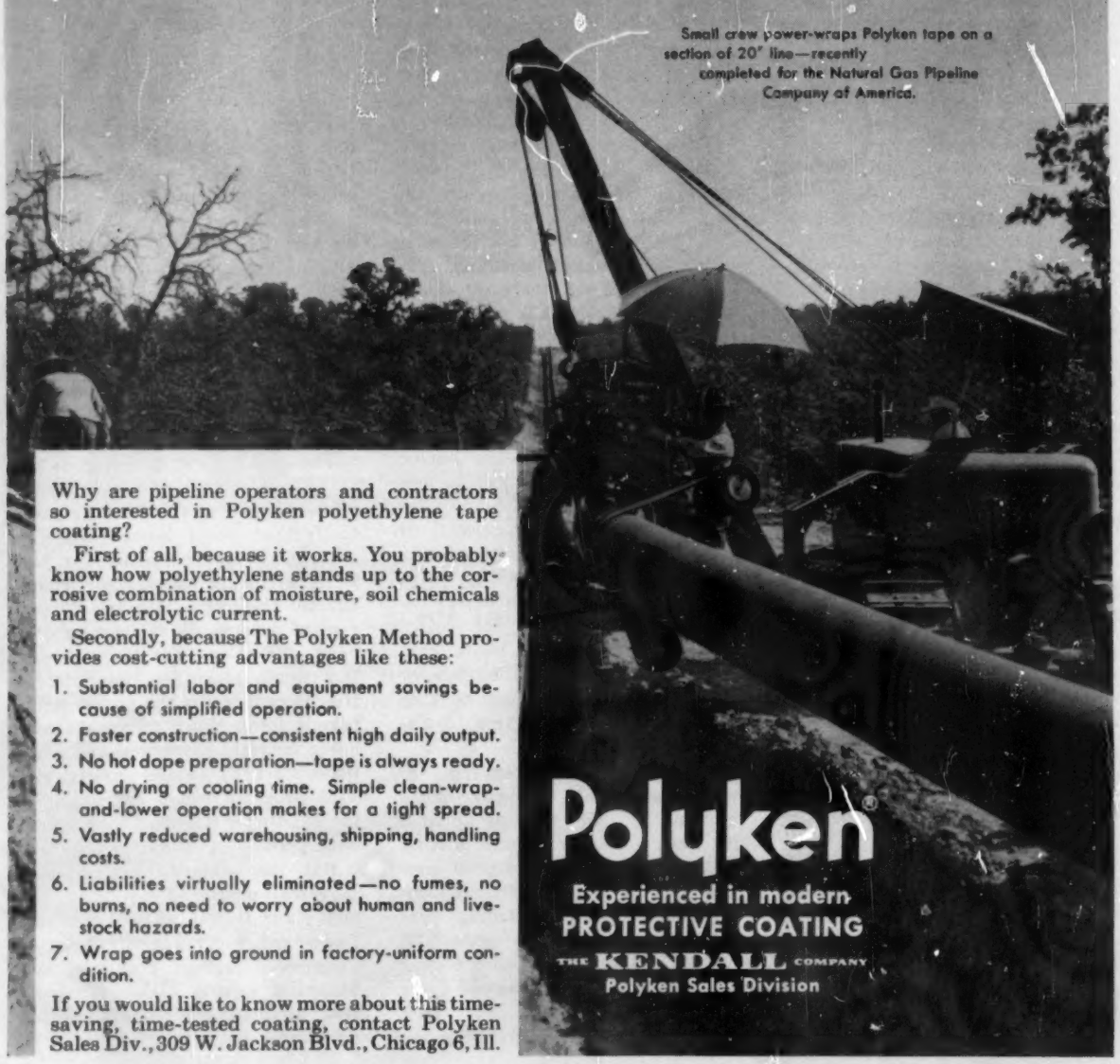

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CORROSION PREVENTION

By MARSHALL E. PARKER

Stray current problems in a large gas distribution system

By H. C. Boone, Peoples Gas Light and Coke Co., Chicago

THIS paper describes some of the problems confronting the corrosion engineer in crowded metropolitan areas, and presents some of the methods of solving these problems. The rapid abandonment of street railways, although it may have removed a prime source of stray currents, has also removed an important source of cathodic protection. And, where the street cars have been replaced by trolley buses, much of the original stray current problem is still present, since the old tracks are still serving as a part of the negative return. Suburban electric railroads, with their larger loads and higher voltages, create even more severe exposures, although in more limited areas.

First measures were taken by the author's company to combat electrolytic corrosion after a failure in 1903. A large potential was found betwen the pipe and nearby street car tracks. Large copper bonds were installed from the main to the nearest substation. Other mains were surveyed and similar bonds installed, until by 1916 there was an extensive network of cables associated with each substation. In the meanwhile, beginning in 1907 and 1908, efforts were being made, both by the city and by an Electrolysis Committee, to improve the continuity of the negative return system and to solve bonding problems in a manner most helpful to all of the owners of underground utilities. The committee has continued to function until the present, and recently a similar organization has been formed for the larger region around the city.

Concurrently with the abandonment of street car systems, and the accompanying drop in bond networks from 12 to 2, there has had to be an increase in the number and extent of cathodic protection installations. Both rectifiers and magnesium anodes are in use, and some development work has been done on the rectification of induced alternating currents on the lines, for cathodic protection.

It is the general conclusion of the author that the advances in protection materials and techniques are just about keeping pace with the growing complexity of the technique requires very sensitive instrument and careful work; it is effective in a large number of instances, although it would probably be inapplicable in a (fluctuating) stray current area.

Heavy current

Another method consists of applying a fairly heavy current between the two structures believed to be in contact, and then tracing the current flow on both structures. It is pointed out that the actual values of IR drops on water mains are unreliable, but that dependence must be placed on locating the point of reversal of direction.

Three methods are given for locating open or high-resistance couplings, in ascending order of their simplicity and effectiveness. Where the pipe is readily contacted, a simple potential survey along its length may locate the open joint. A pipe locator may be used, with the joint found by the drop in tone; this test may fail in the case of large flanged points, or in the case of a joint which is partially conductive. The third method involves the application of a large current to a length of the line, and the careful tracing of IR drops over short spans; a span whose drop is excessive for its length indicates the presence of a resistant joint.

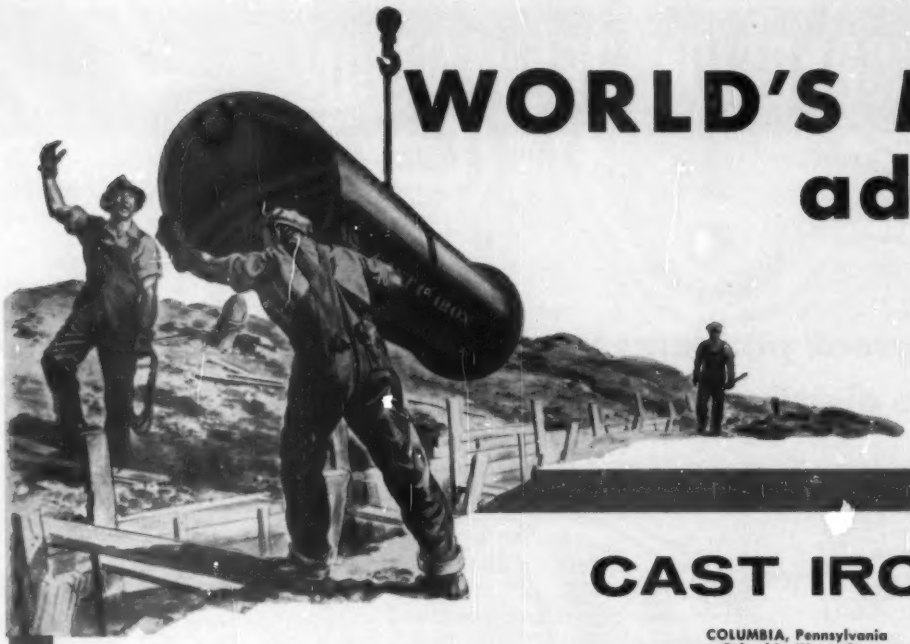
The method of locating broken or severed anode lead wires by means of surface potential surveys is described; the author states that, on occasion, it is even possible to locate the exposed end of the broken wire, since it may be acting as an anode. The same technique may be used to give at least a rough indication of the relative current output of individual anodes in a group.

Holiday detection

An adaptation of the Pearson method for locating holidays is given. Instead of AC, an interrupted DC current is used; the exploration is done with two half-cells, the test current being identified by its known interruption cycle. This avoids the high noise level usually encountered in attempts to use the Pearson method in urban areas.

Although the methods described are primarily adapted to use in congested areas, several of them appear to be useful even on long lines, especially for the detailed location of trouble when the general area has been determined.

This article has been abstracted from papers presented at the NACE South Central Regional Conference held in Oklahoma City in October.



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ATLANTA, Georgia
Atlanta Gas Light Company

BALTIMORE, Maryland
Bureau of Water, Dept. of Public Works

BALTIMORE, Maryland
Baltimore Gas and Electric Company

*BANGOR, Maine
Citizens Utilities Company, Gas District

*BETHLEHEM, Pennsylvania
The United Gas Improvement Company

BOSTON, Massachusetts
Public Works Dept., Water Division

BOSTON, Massachusetts
Boston Consolidated Gas Co.

BOUND BROOK, New Jersey
Public Service Electric & Gas Co.

BRIDGEPORT, Connecticut
Bridgeport Gas Light Company

BUFFALO, New York
Dept. of Public Works, Div. of Water

*CAMBRIDGE, Massachusetts
Cambridge Water Board

*CARLISLE, Pennsylvania
The United Gas Improvement Co., Gas Divisio...

*CATASAUQUA, Pennsylvania
The United Gas Improvement Company

*CHAMBERSBURG, Pennsylvania
Borough of Chambersburg, Gas Department

CHARLESTON, South Carolina
South Carolina Electric & Gas Co.

CHICAGO, Illinois
Peoples Gas Light & Coke Company

CHICAGO, Illinois
Water Works Department

CINCINNATI, Ohio
Cincinnati Gas & Electric Co.

COLUMBIA, Pennsylvania
Columbia Water Company

DETROIT, Michigan
Board of Water Commissioners

DETROIT, Michigan
Michigan Consolidated Gas Co.

ELIZABETH, New Jersey
Elizabethtown Consolidated Gas Co.

EVANSVILLE, Indiana
Southern Indiana Gas & Electric Co.

FALL RIVER, Massachusetts
Fall River Gas Works Company

FREDERICK, Maryland
City of Frederick Water Dept.

FREDERICK, Maryland
Frederick Gas Company, Inc.

CITY OF FREDERICKSBURG, Virginia
Gas Department

*HAGERSTOWN, Maryland
Hagerstown Gas Company

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*HARRISBURG, Pennsylvania
The United Gas Improvement Co., Harrisburg Gas Div.

HARTFORD, Connecticut
The Hartford Gas Company

HARTFORD, Connecticut
Water Bureau, Metropolitan District

HUNTSVILLE, Alabama
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LOUISVILLE, Kentucky
Louisville Gas & Electric Co.

LYNCHBURG, Virginia
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*NEW YORK, New York
Consolidated Edison Company of N. Y., Inc., Gas Div.

NEW YORK, New York
Dept. of Water, Gas & Electricity

NORRISTOWN, Pennsylvania
Philadelphia Electric Co., Gas Dept.

*NORWICH, Connecticut
Department of Public Works, Gas Division

*OTTAWA, Ontario
Ottawa Gas

PAINESVILLE, Ohio
City of Painesville, Gas Distribution Dept.

PEORIA, Illinois
Central Illinois Light Company

PHILADELPHIA, Pennsylvania
Dept. of Public Works, Bureau of Water

PHILADELPHIA, Pennsylvania
Philadelphia Gas Works Co.

PITTSBURGH, Pennsylvania
Bureau of Water, Dept. of Public Works

PLYMOUTH, Massachusetts
Plymouth Gas Light Company

POTTSVILLE, Pennsylvania
Pottsville Water Company

*POUGHKEEPSIE, New York
Central Hudson Gas & Electric Corporation, Gas Division

PROVIDENCE, Rhode Island
Providence Gas Company

QUEBEC, Quebec
Quebec Power Co., Gas Division

READING, Pennsylvania
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RICHMOND, Virginia
Department of Public Utilities (Gas)

RICHMOND, Virginia
Dept. of Public Utilities (Water)

ROCHESTER, New York
Rochester Gas & Electric Corp.

SACRAMENTO, California
Division of Water & Sewers

ST. JOHN, New Brunswick
Water & Sewerage Department

ST. LOUIS, Missouri
Dept. of Public Utilities, Water Div.

SALEM, Massachusetts
North Shore Gas Company

*SANDUSKY, Ohio
The Ohio Fuel Gas Company

SAVANNAH, Georgia
South Atlantic Gas Company

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SYRACUSE, New York
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TORONTO, Ontario
The Consumer's Gas Co. of Toronto

TROY, New York
Department of Public Works

UTICA, New York
City of Utica, Board of Water Supply

*WASHINGTON, D. C.
Washington Gas Light Company

WHEELING, West Virginia
City of Wheeling Water Department

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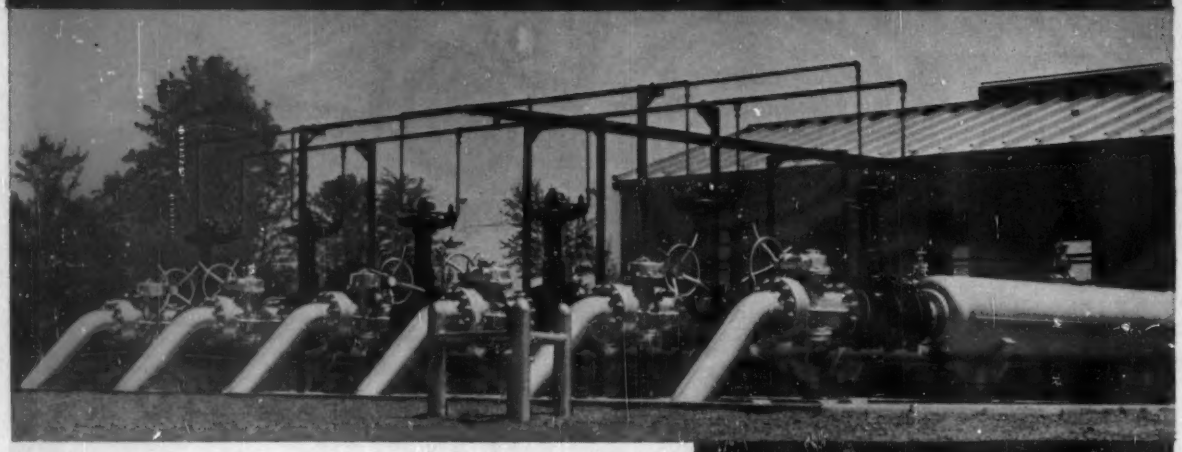
RESEARCH ASSOCIATION
THOMAS F. WOLFE, MANAGING DIRECTOR
CAST IRON
SUITE 3440, PRUDENTIAL PLAZA, CHICAGO 1, ILLINOIS

How remote control dispatching by Texas Gas Transmission Corp. delivers GAS to American Louisiana Pipeline Co.



At Texas Gas Transmission Corporation's measurement station near Slaughters, Kentucky, need for attending personnel is eliminated by use of American® Telemetering equipment, Remote-Set Flow Controllers, Pressure and Differential Transmitters, Reliance Motor Valves and American-Westcott Orifice Meters.

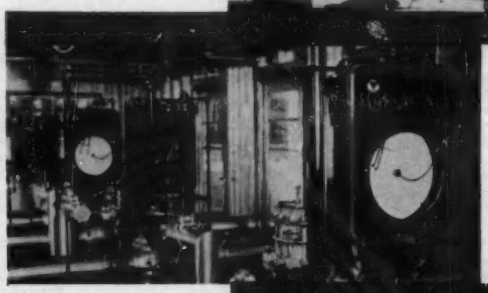
Personnel at the compressor station office, located one-half mile from the measurement station, dispatch gas to the American Louisiana Pipeline Company entirely by remote control from Telemetering data.

The station is supplied from two parallel 26-inch lines and consists of six 8-inch orifice meter runs between two 26-inch headers. Optimum operating range of the station is 10,000 Mcf per day to 150,000 Mcf per day, with a maximum of 480,000 Mcf per day at 800 psig, should it be required.

This model station is another example of American's precision made, dependable equipment for gas measurement, regulation and control from well-head to burner-tip.

For measurement engineering assistance in your remote control and measurement problems, consult your American Meter representative.

Six Reliance Type CBVA Motor Valves, equipped with valve positioners, control flow — are operated by American Series A-88 Remote-Set Flow Controllers.



Six 8-inch orifice meter runs, equipped with American-Westcott Orifice Meters, accurately measure flows of 10,000 Mcf to 150,000 Mcf per day.

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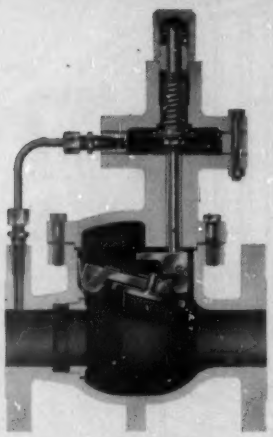
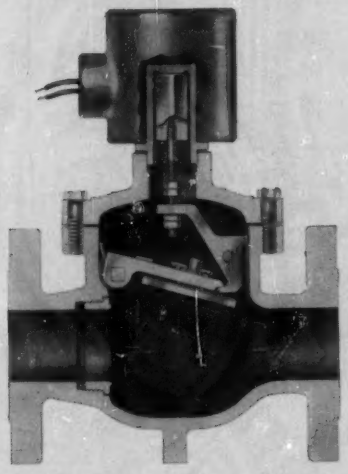


Model 1500H shown, is a high pressure shut-off valve which closes automatically and instantly when predetermined high pressure is reached. With addition of a fusible metal plug, valve can be furnished to shut off on overpressure and/or over-temperature. With control pressure above diaphragm, valve can be made into a low pressure shut-off valve. Combination high and low pressure shut-off also available.



Model 1700 shown, is a Solenoid operated valve normally energized to maintain valve in open position. On interruption of electric current valve closes instantly. Model 1800 Solenoid shut-off valve available to shut off gas instantly by applying electric current either automatically or through a "panic" button.

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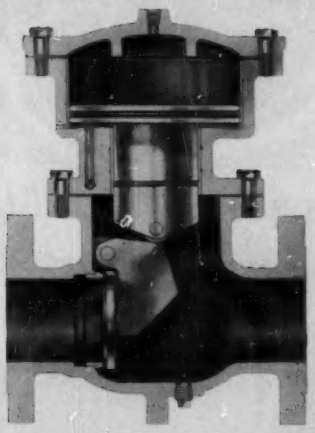

Model 3000 shown, is a piston operated valve, which opens instantly when pressure above the piston is released. Restoring the pressure above the piston closes the valve. The operating pressure above the piston can be obtained from the line or from an independent source of gas or liquid and can be automatically released or applied by instrument air or gas operated pilots or by use of a small three-way Solenoid valve.

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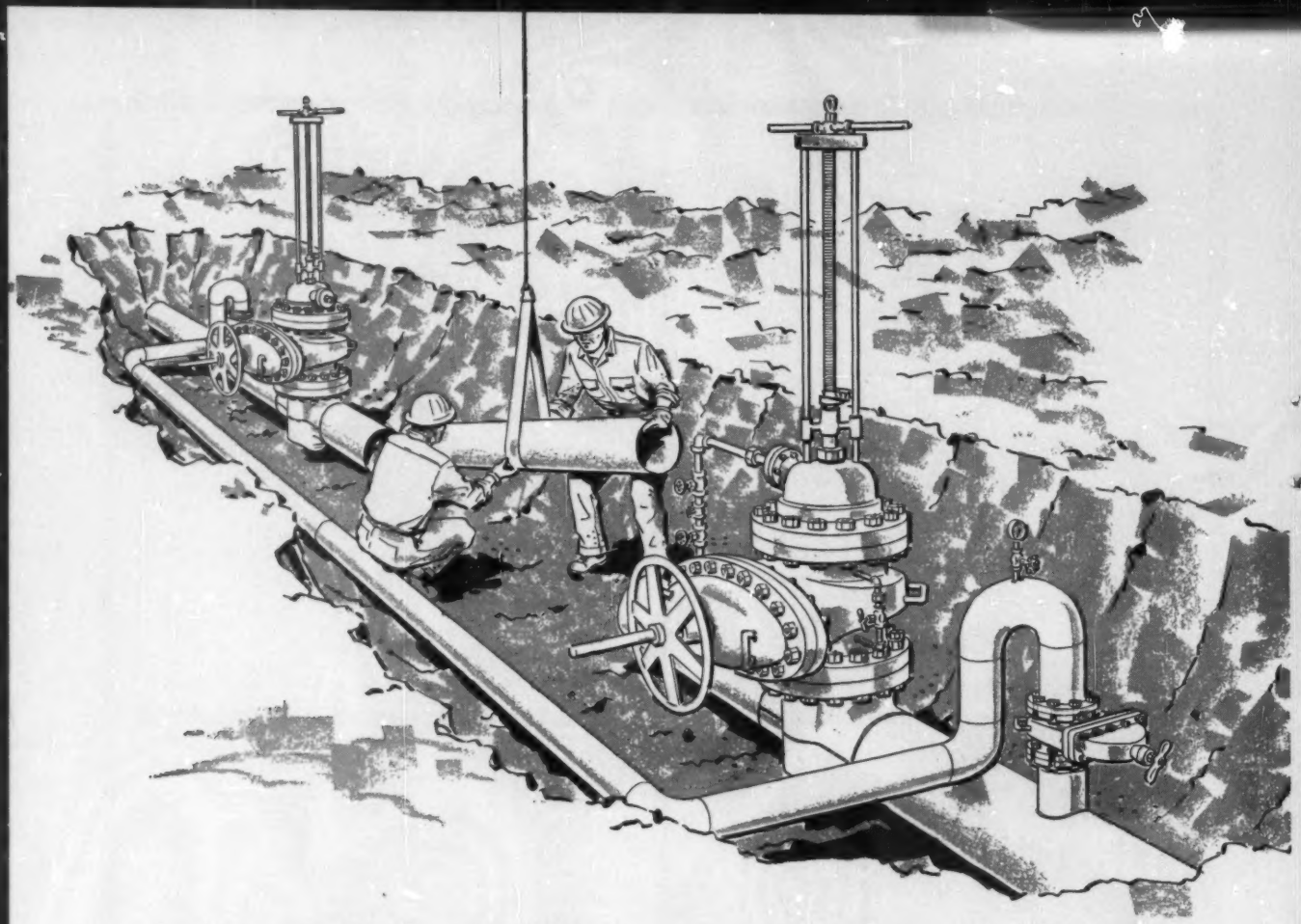

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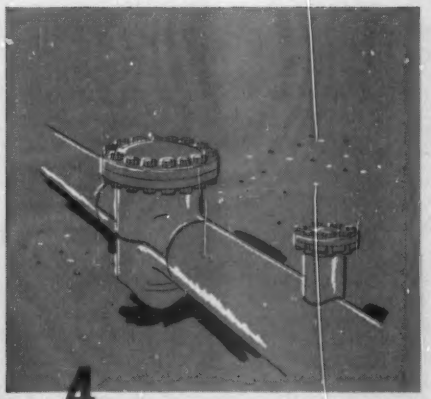


4

COMPLETE LINE WORK! Make necessary repairs, tie-ins or relocations. Relax stoppers and remove stopping machines. Remove by-pass, insert completion plugs and caps on nipples. Install completion plugs and caps on fittings.

MUELLER® NO-BLO® Method

The Mueller NO-BLO® Method and equipment permit the installation of No-Blo fittings into a system under pressure, without escape of gas. Safety is assured and service is *not* interrupted. Call your Mueller Representative or write direct for information.

MUELLER CO. 100th YEAR SERVING the Water and Gas Industries QUALITY

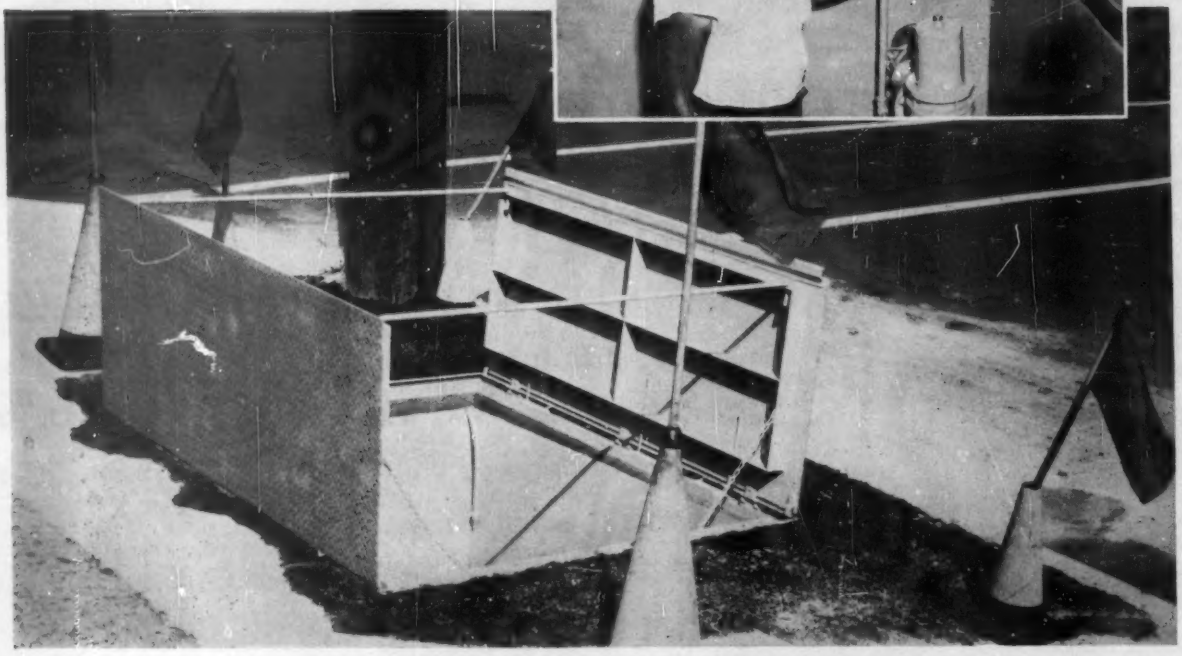
Since 1857

MUELLER CO.

DECATUR, ILL.

Factories at: Decatur, Chattanooga, Los Angeles;
In Canada: Mueller, Limited, Sarnia, Ontario

For Trouble-Free Off-the-Road Regulator Installations



Bilco Sidewalk Doors provide a safe, easy-opening, watertight protective cover!

Because of the rising cost of street vault construction and increasing traffic hazards, gas companies in many cities are now placing their district regulator equipment in "under-the-sidewalk" locations. They're installing Bilco Sidewalk Doors — for the improved ventilation, built-in drainage features, ease of maintenance, durability and all-around safety you'll get when *you* specify Bilco!

EVER TRY TO LIFT AN ORDINARY SIDEWALK DOOR?

Bilco sidewalk access doors have built-in lift springs for effortless one-man operation. The most outstanding improvement ever made in the manufacture of heavy plate horizontal access doors.

Send coupon today for free copy of reprint from Gas Magazine, entitled:
"Standardization and Prefabrication of District Regulator Installations"

The Bilco Co., Dept. 438, New Haven 5, Conn.
Send folder on "Standardization & Prefabrication" ☐
Send catalog with details of Bilco Sidewalk Doors ☐

NAME.....
FIRM.....
ADDRESS.....
CITY..... STATE.....

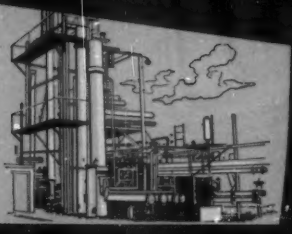
Bilco®
DOORS FOR SPECIAL SERVICES

geared for service

Your Captan Man

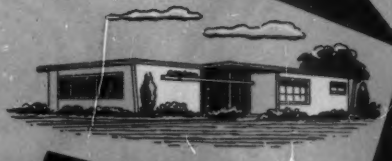
NATURAL GAS ODORIZING, INC.

P. O. BOX 15252
HOUSTON 20, TEXAS



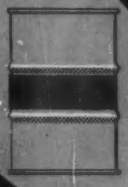
public relations

safety



economy

Convenient Warehouses

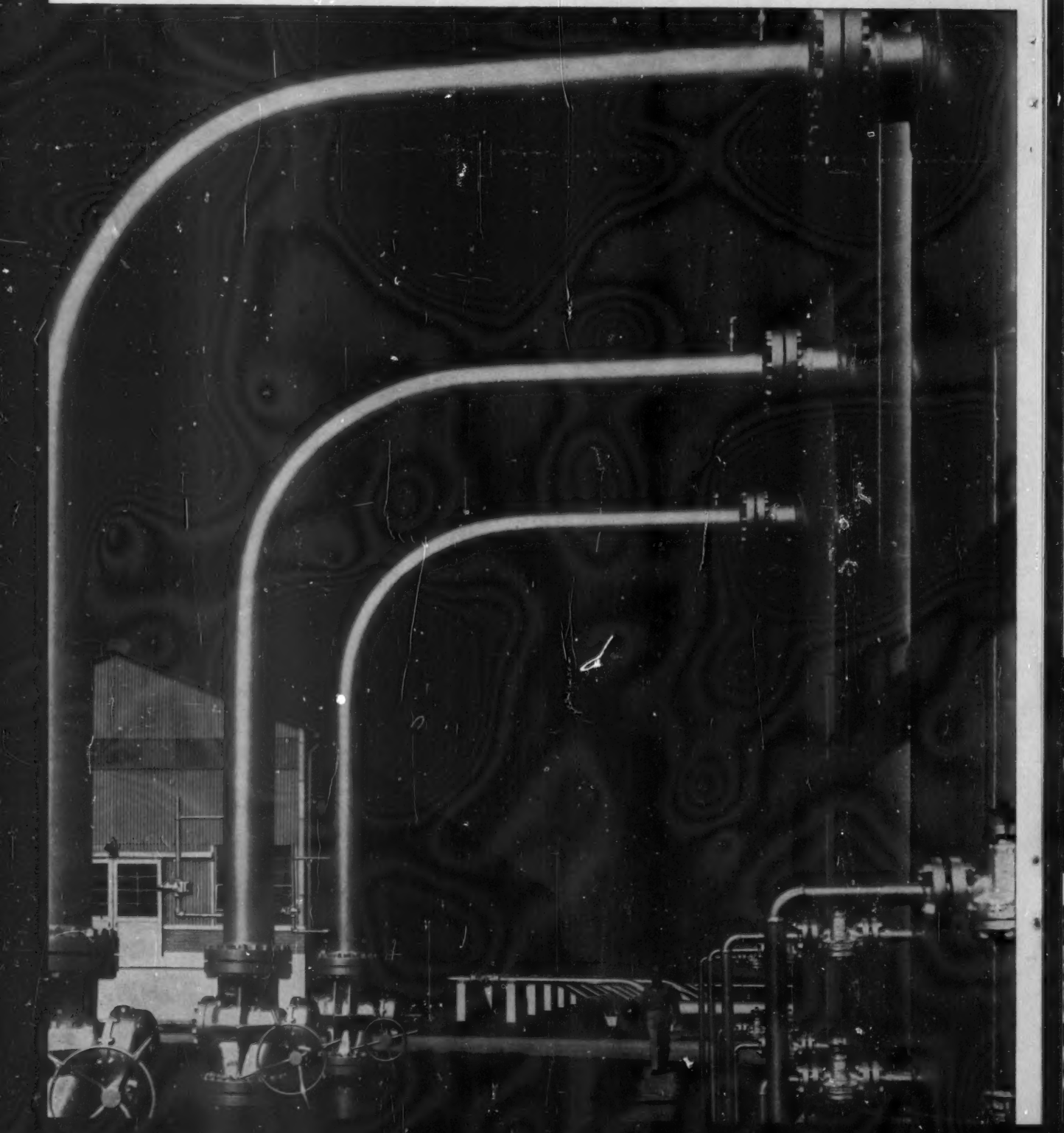


employee relations

The Gas Industry

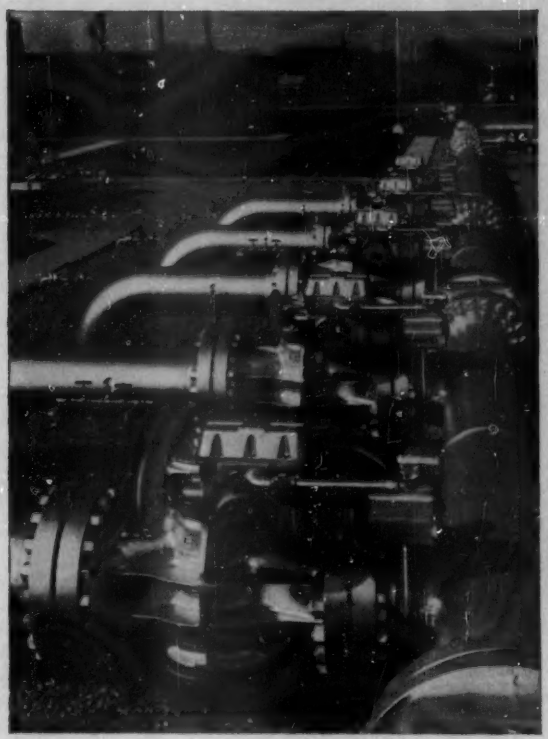
Reliability =

ROCKWELL-Nordstrom VALVES



Profitability

Keep pipelines profitably on stream



Valve down time often plays a large part in the profitability of gas, petroleum and products pipelines. Years of exceptionai performance records and cost studies prove that Rockwell-Nordstrom valves are the best way to keep profitably on stream. Here are three reasons why you see so many Rockwell-Nordstrom valves on so many pipelines:

LEAKPROOF SAFETY: Pressurized lubricant sealing eliminates risky "forced" seating . . . prevents internal or external leakage of lightest gases or heaviest liquids.

FAST, DEPENDABLE: Quarter-turn closure . . . lubricant jacking for instant operation . . . power operation is simpler, less costly.

ECONOMICAL: First cost is no higher (often lower) than ordinary valves . . . elimination of metal-to-metal wearing friction and unexposed seats assure low maintenance and long life.

Rockwell-Nordstrom valves are available in a complete range of sizes and pressure ratings in steel, semi-steel and corrosion resisting metals. For more information, see your nearest supplier or write: Rockwell Manufacturing Company, Pittsburgh 8, Pa.

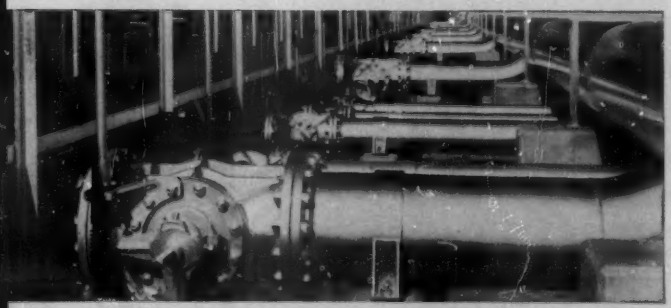
Canadian Valve Licensee: Peacock Brothers Limited

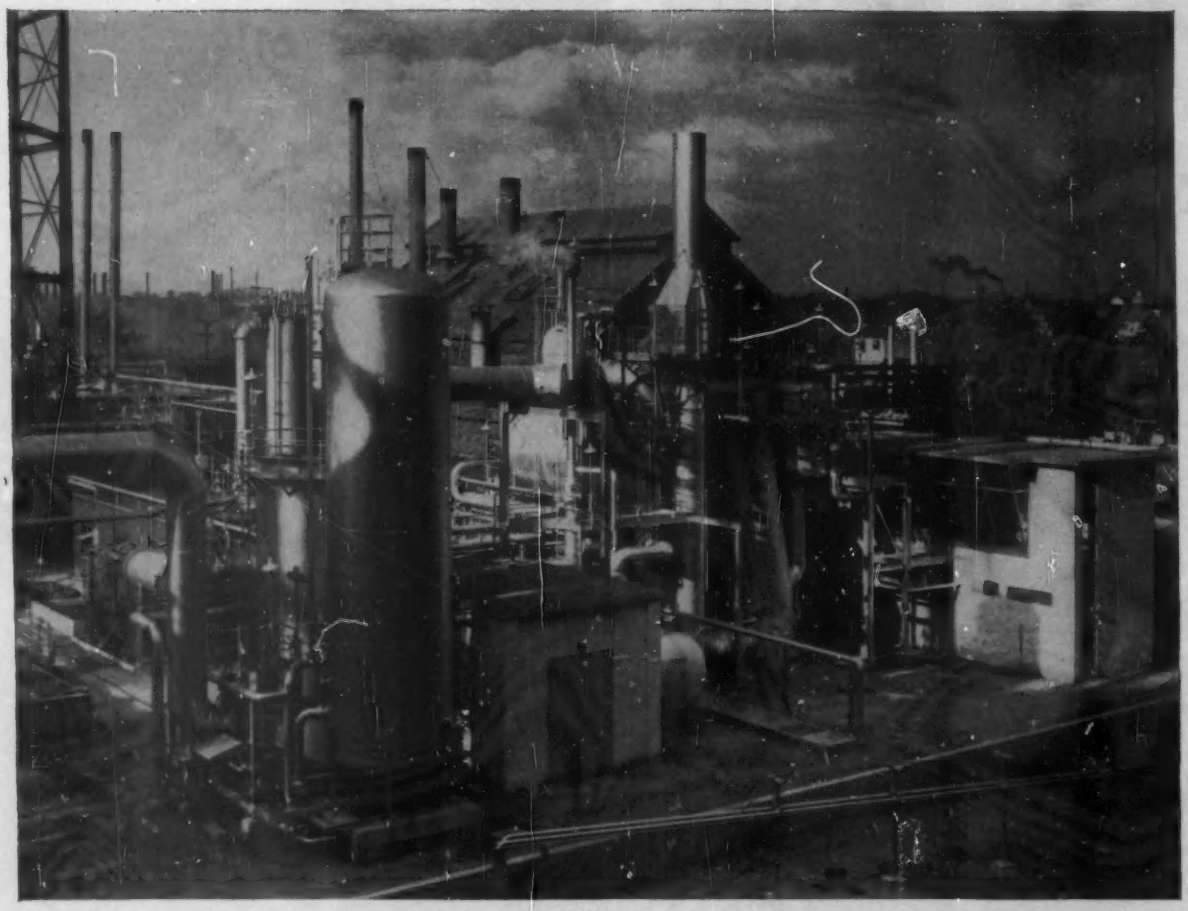
ROCKWELL-Nordstrom VALVES

it's **ROCKWELL**

MANUFACTURING COMPANY

42nd YEAR *of lubricated plug valve leadership*





Above is a CCR* unit, recently installed by United Engineers for Philadelphia Electric Co. at its West Conshohocken, Pa., plant. This 13' 0" set provides additional gas production needed to meet the growing demands of Delaware Valley homes and industries.

For gas production equipment offering flexibility, efficiency and economy, call on United Engineers

Will your production equipment meet every demand made on it? Will it process *all* standard feed stocks, as well as natural gases? Can you adjust easily and quickly from one feed stock to another?

If your answer to any of these questions is no, we can be of real service to you. The versatile unit shown is a U.G.I. Cyclic Catalytic Reforming (CCR) Process* Unit. The process is capable of producing high and low gravity city gases with a range of from 325-1000 Btu and can use all standard feed stocks—natural gas, L.P. gases, gasoline, naphtha or kerosene.

In design and development of today's finest gas production processes and equipment we enjoy an outstanding position. Our background of 70 years in serving the gas industry can help *you* in planning facilities to your special needs. And the fact that many of our clients select us time and again to help execute their projects speaks for the caliber of our services. We invite you to share and profit from all that we have to offer.

*Patents pending

UNITED ENGINEERS

& Constructors Inc

U.E.&C. (Canada) Ltd.

New York • PHILADELPHIA • Chicago

U-Brand Loops and Bends give you faster, safer gas meter installations!

Fewer connections to make . . . less chance of leaks

As you see in the gas meter installations below, use of U-Brand Loops greatly reduces necessary fitting and nipple connections. You get faster, cheaper . . . yet safer meter installations. That's why leading meter manufacturers and gas companies recommend the use of loops and bends.

U-Brand 180° Loops and 90° Bends are available in ½" to 2" diameters with any radius or leg length. Special bends on request. Your choice of galvanized, electro-plated galvanized or black U-Cote finish.

There's a U-Brand Loop or Bend to save you time and money on every meter installation. Buy U-Brand Loops and Bends at your Supply House today!

A single source for all your pipe fitting needs

Galvanized and Black U-Cote Malleable Iron Pipe Fittings—Unions —Plugs and Bushings—Cast Iron Drainage and Screwed Fittings—Steel Nipples and Couplings—Insert Fittings for Plastic Pipe.

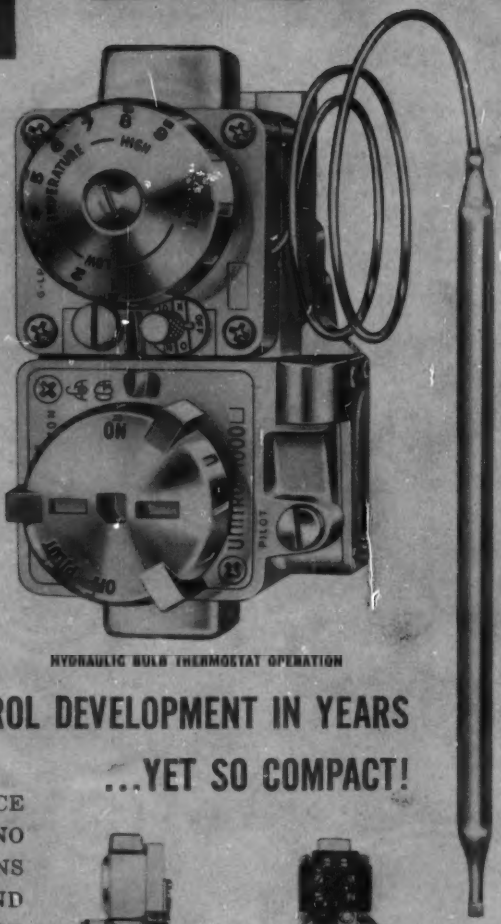
U BRAND

The **Union Malleable** Manufacturing Company

Ashland, Ohio

IT'S BRAND NEW

ROBERTSHAW UNITROL 1000



HYDRAULIC BULB THERMOSTAT OPERATION

BIGGEST SPACE AND CENTRAL GAS HEATING CONTROL DEVELOPMENT IN YEARS

...YET SO COMPACT!

HERE IS A NEW WAY TO LOWER INVENTORY AND SERVICE COSTS: IN THE FIELD... IN YOUR PLANT, WITH NO SPECIAL TOOLS REQUIRED, YOU CAN SELECT COMBINATIONS OF THE BASIC CONTROL (MANUAL OPERATION) AND ANY OF THESE FIVE UNITS TO PROVIDE FOR HYDRAULIC BULB OR ROOM THERMOSTAT OPERATION.

- Snap action, self-contained, hydraulic thermostat
- Snap full on—Snap off to bypass hydraulic thermostat
- Snap on to high flame—Throttle down to bypass—snap off, hydraulic thermostat
- Room thermostat silently operating gas valve (24 volts)
- A gas pressure regulator

MANUAL OPERATION

ROOM THERMOSTAT OPERATION

inquire today—contact:

Robertshaw-Fulton CONTROLS COMPANY

GRAYSON CONTROLS DIVISION, LONG BEACH, CALIFORNIA

service!

Hundreds of American gas companies are still using cast iron gas mains laid fifty years and more ago. Fifty five of these, in fact, have passed the century mark in service! What other pipe can approach, much less equal, this unique record? What's more, the modernized cast iron pipe, centrifugally cast today, is even tougher, stronger, more uniform.

"Service" is another name for cast iron.

The record proves it!

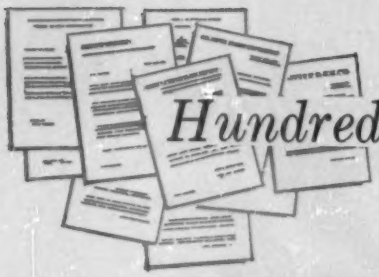
Service is Built Into Cast Iron

- Standardized mechanical joints are bottle-tight for usual gas distribution pressures... and for all types of gas.
- Centrifugally cast pipe is tough, strong and uniform.
- Joint design allows for deflection during and after installation.
- Service connections are easily made.
- Long life a matter of record.
- No shortages. Cast Iron Pipe is immediately available.

U.S. cast iron PIPE

U. S. PIPE AND FOUNDRY COMPANY
General Office: Birmingham 2, Alabama

A WHOLLY INTEGRATED PRODUCER
FROM MINES AND BLAST FURNACES TO FINISHED PIPE.



Hundreds of Utilities Accepted Our Offer

"FREE TEST THIS NEW HOME GAS FILTER at our expense"

The response has been overwhelming! It has proved to us the great need for this economical gas filter for installation right in the home.

It's the economical way to remove dirt, pipe scale, and other foreign matter from natural gas lines, and keep your customers' appliances operating efficiently.

Thousands are already in use . . . hundreds more are now on test. Why don't you take steps to minimize service calls by stopping dirt—the major source of clogged pilots—right in the home?

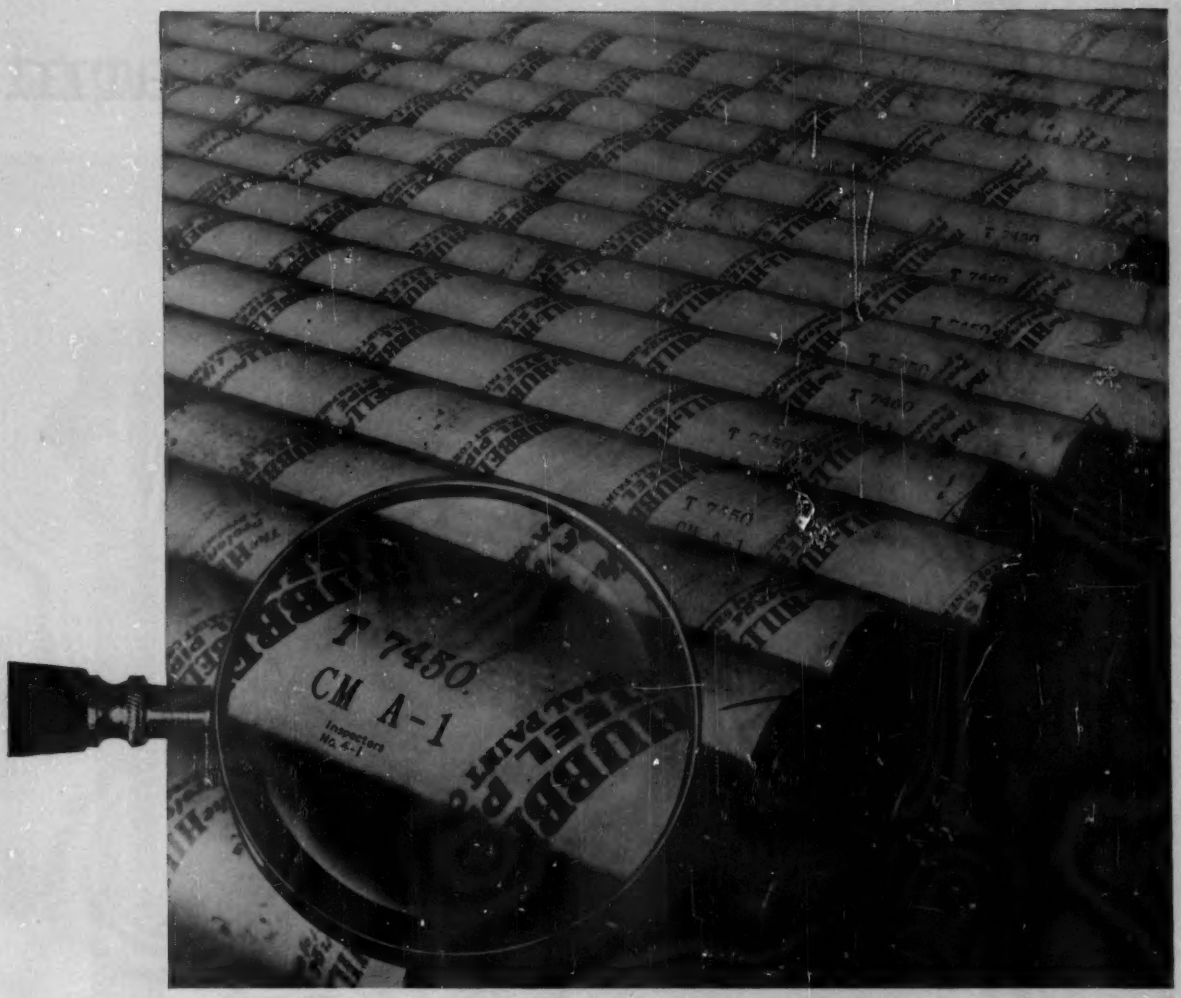
Accept our FREE offer

to give you a Staynew Home Gas Filter without obligation. Test it any way you like, and see for yourself its many advantages. All we ask is that you write us on your company letterhead so we are sure the filter goes only to authorized personnel. Address: Dollinger Corporation, 68 Centre Park, Rochester 3, N. Y.

PROTECTOMOTOR U.S. PAT. OFF.

STAYNEW DOLLINGER FILTERS

LIQUID FILTERS • PIPE LINE FILTERS • INTAKE FILTERS • HYDRAULIC FILTERS • ELECTROSTATIC FILTERS • MIST COLLECTORS • DRY PANEL FILTERS • SPECIAL DESIGN FILTERS • VISCOUS PANEL FILTERS • LOW PRESSURE FILTERS HIGH PRESSURE FILTERS • AUTOMATIC VENTILATION FILTERS • NATURAL GAS FILTERS • SILENCER FILTERS



What? Autograph a piece of pipe?

Yes! The numbers stamped on Hill-Hubbell pipe wrapping are the job number, specification and signature of the man who inspected that pipe. When a Hill-Hubbell inspector signs a pipe he identifies the job and gives you his personal guarantee that the pipe is protected perfectly... permanently... to the ordered specifications.

Hill-Hubbell inspectors use modern electronic testing equipment to check every square inch of every pipe before it leaves the factory. In the field the stamp identifies the pipe as to job and specification. Hill-Hubbell inspectors have autographed pipe for 25 years... another "Quality-Control" first, pioneered by Hill-Hubbell.

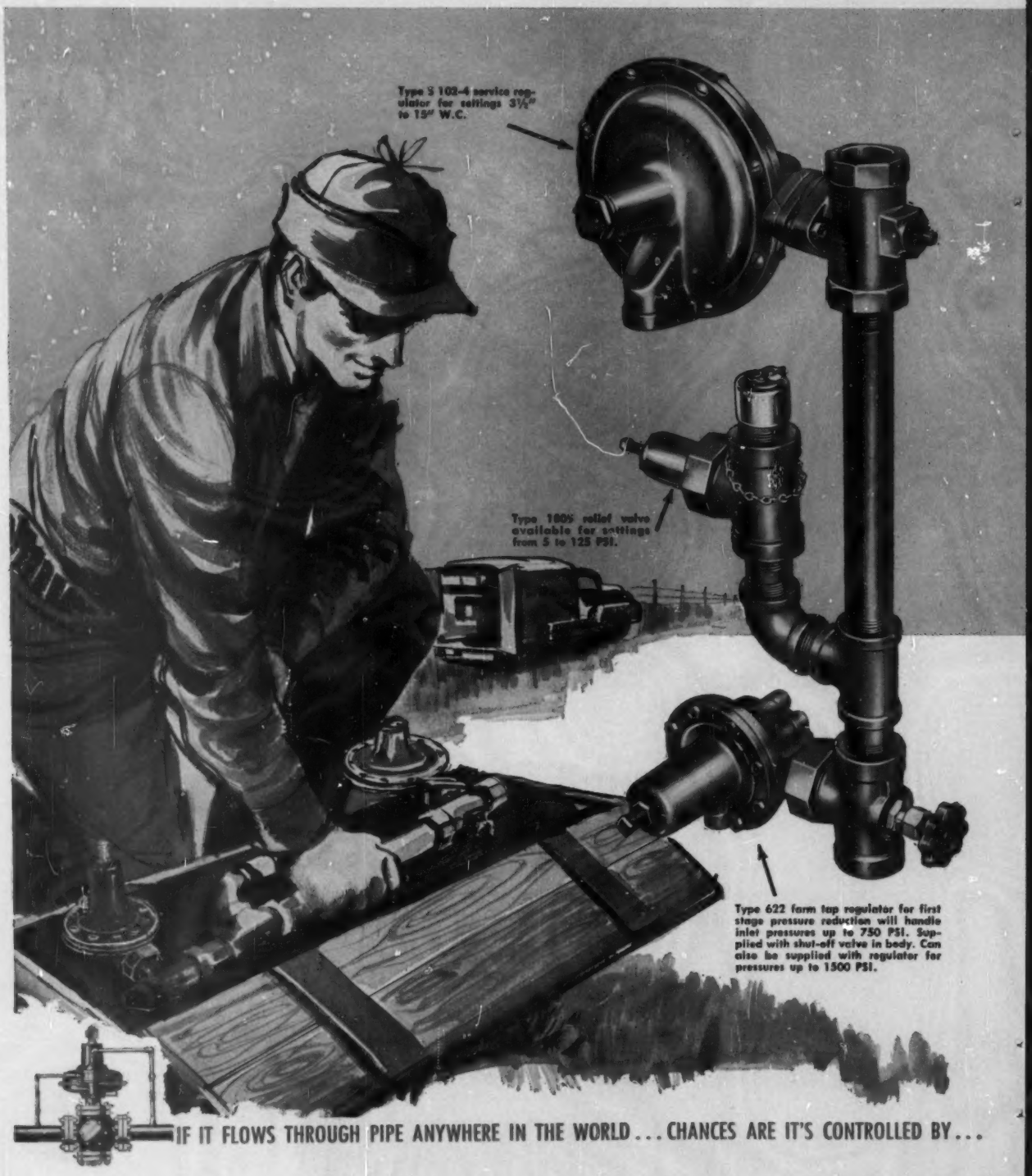
Specify Hill, Hubbell wrapped pipe on your next job

FACTORY APPLICATORS OF COATINGS AND WRAPPINGS

HILL·HUBBELL & COMPANY

DIVISION OF GENERAL PAINT CORP. • 3001 MAYFIELD ROAD, CLEVELAND 18, OHIO

Look...a complete farm


Type S 102-4 service regulator for settings 3½" to 15" W.C.
Type 1800 relief valve available for settings from 5 to 125 PSI.
Type 622 farm tap regulator for first stage pressure reduction will handle inlet pressures up to 750 PSI. Supplied with shut-off valve in body. Can also be supplied with regulator for pressures up to 1500 PSI.

IF IT FLOWS THROUGH PIPE ANYWHERE IN THE WORLD... CHANCES ARE IT'S CONTROLLED BY...

tap that's ready to hook up!

It's piped up. Now you have a complete assembly of the first stage regulator, relief valve and service regulator bucked-up complete with piping, ready to install. No more searching for individual items. No more building of the farm tap hook-up on the job.

It's pressure-tested. Fisher tests and sets the farm tap assembly at the factory.

It's completely packaged. The farm tap assembly comes in a sturdy carton assembled to your specifications. Cuts down the number of individual cartons and boxes it was previously necessary to haul around with you.

Think of the savings in time and manpower

Fisher has done much of the farm tap installation work for you. Fisher has cut out the wasted time looking for individual regulators—the cutting and threading of pipe to size—the assembly of the individual items. The packaged unit is available in a wide range of assemblies to meet your pressure or piping requirements. Fisher will tailor-make a farm tap assembly for your individual conditions.

It's another Fisher first. A complete farm tap that's ready to hook up.

Write for bulletin numbers P11A and S100 which illustrate and describe Fisher Farm Tap Equipment.

FISHER®

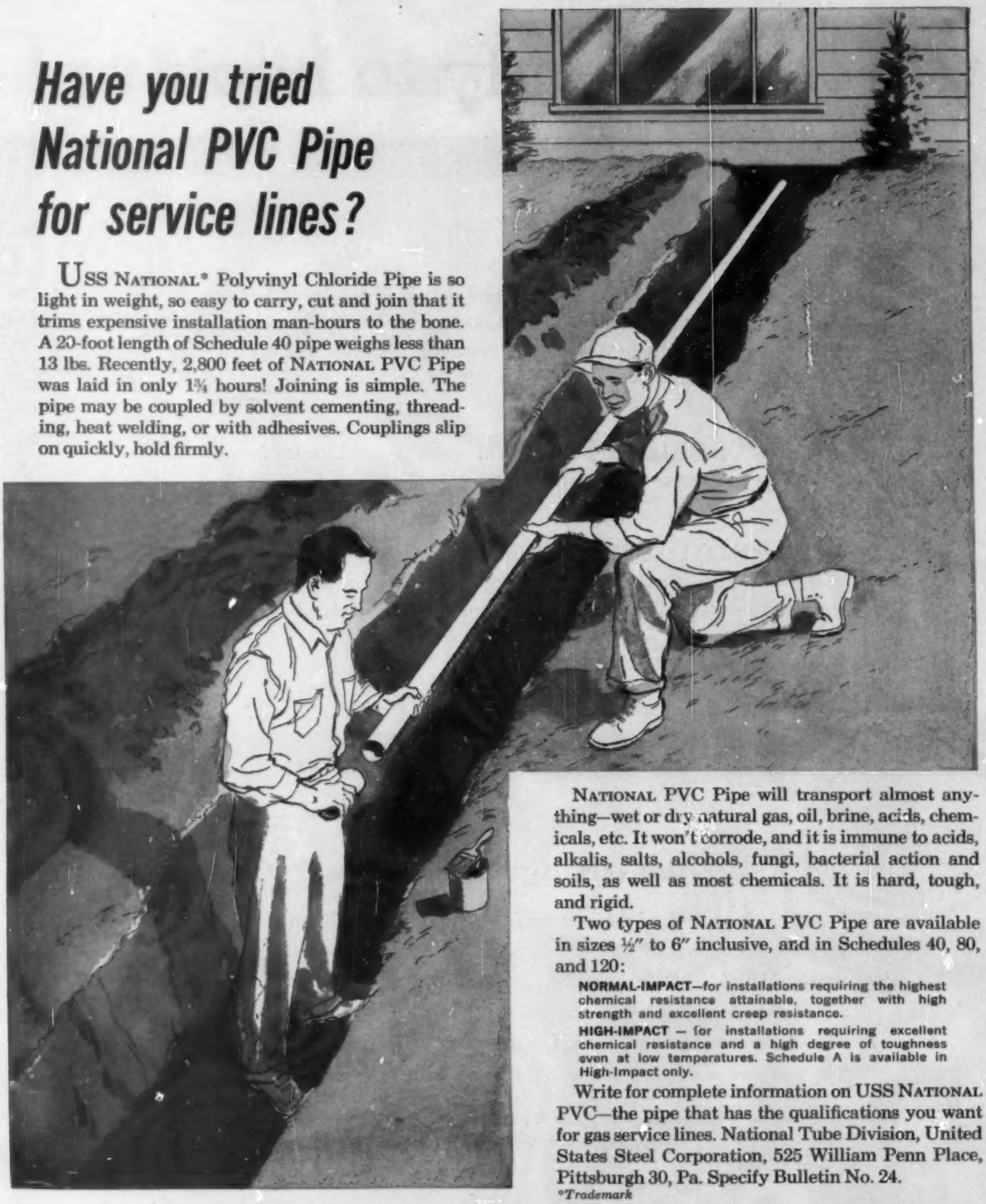
SINCE 1880

FISHER GOVERNOR COMPANY

Marshalltown, Iowa/Woodstock, Ontario/London, England

Have you tried National PVC Pipe for service lines?

USS NATIONAL* Polyvinyl Chloride Pipe is so light in weight, so easy to carry, cut and join that it trims expensive installation man-hours to the bone. A 20-foot length of Schedule 40 pipe weighs less than 13 lbs. Recently, 2,800 feet of NATIONAL PVC Pipe was laid in only 1¾ hours! Joining is simple. The pipe may be coupled by solvent cementing, threading, heat welding, or with adhesives. Couplings slip on quickly, hold firmly.



NATIONAL PVC Pipe will transport almost anything—wet or dry natural gas, oil, brine, acids, chemicals, etc. It won't corrode, and it is immune to acids, alkalis, salts, alcohols, fungi, bacterial action and soils, as well as most chemicals. It is hard, tough, and rigid.

Two types of NATIONAL PVC Pipe are available in sizes ½" to 6" inclusive, and in Schedules 40, 80, and 120:

NORMAL-IMPACT—for installations requiring the highest chemical resistance attainable, together with high strength and excellent creep resistance.

HIGH-IMPACT — for installations requiring excellent chemical resistance and a high degree of toughness even at low temperatures. Schedule A is available in High-Impact only.

Write for complete information on USS NATIONAL PVC—the pipe that has the qualifications you want for gas service lines. National Tube Division, United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pa. Specify Bulletin No. 24.

**Trademark*

National Tube Division, United States Steel Corporation, Pittsburgh, Pa.
Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
United States Steel Export Company, New York

USS NATIONAL **PVC** PIPE

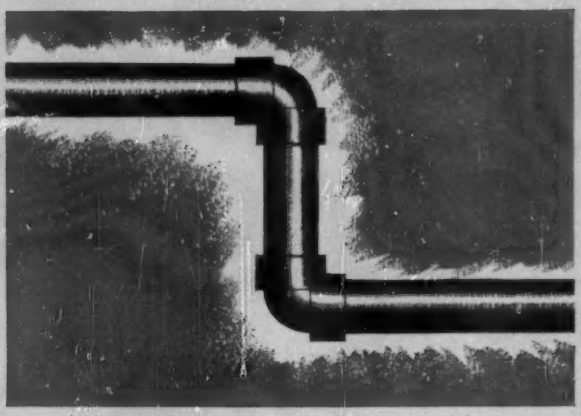
This seal of the National Sanitation Foundation means—Tested . . . Approved . . . Sanitary!

UNITED STATES STEEL

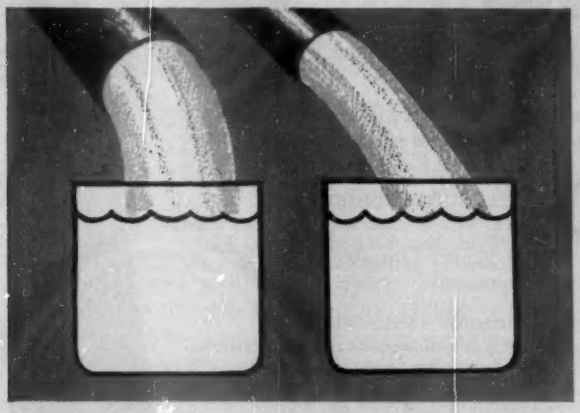
News about

B.F.Goodrich Chemical *raw materials*

1. lower first cost . . . *Piping made from rigid Geon polyvinyl raw materials generally costs less than standard steel pipe wrapped for corrosion protection. Savings with comparable sizes range up to 25%.*



2. corrosion resistant . . . *Geon vinyl is unaffected by chemical corrosion from soil conditions. Likewise it is immune to galvanic action —the major source of high-cost pipeline trouble.*



3. greater fluid delivery . . . *A Geon pipe 20% smaller in diameter than steel pipe gives the same fluid delivery because of lower frictional loss.*

4. faster installation . . . *Besides being light, Geon pipe is easy to handle, cut and join. Two men can lay a mile of three-inch Geon pipeline in eight hours. A similar lay with metal pipe would take 24 to 30 hours; cement-lined pipe some 80 hours.*

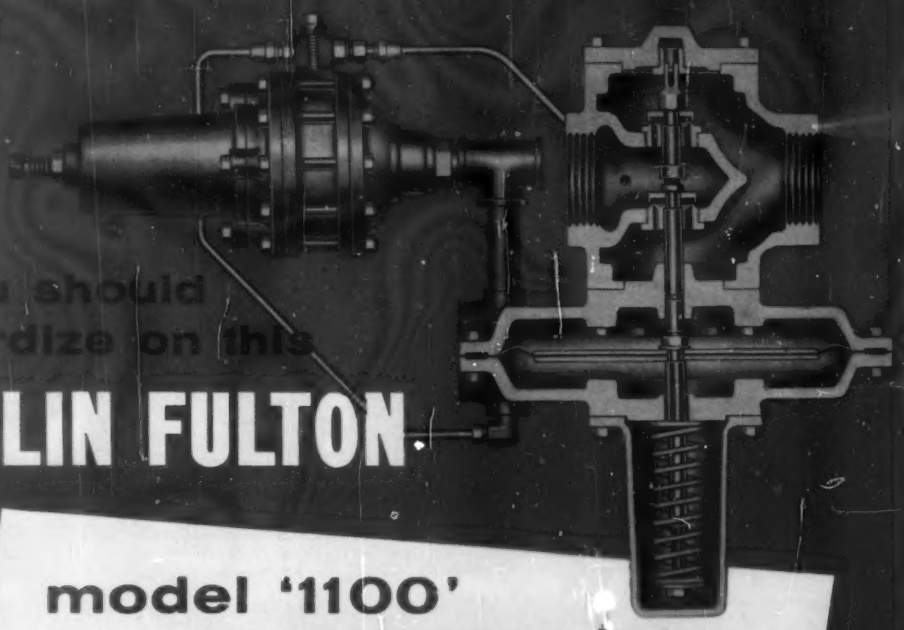
4 ways you save with Geon vinyl pipe

IN performance, too, you save with Geon vinyl pipe. It has high impact and tensile strength, is exceptionally resistant to oil, acids, alkalis and most chemicals. Its smooth internal surface reduces flow resistance, inhibits build-up of deposits.

Get information on rigid Geon polyvinyl compounds 8700A and 8750 for rigid plastic pipe. Write Dept. LM-1, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

B.F.Goodrich Chemical Company
a division of The B.F.Goodrich Company

B.F.Goodrich GEON polyvinyl materials • HYCAR American rubber and latex • GOOD-RITE chemicals and plasticizers • HARMON colors



you should standardize on this

CHAPLIN FULTON

model '1100' gas regulator

Let's not beat around the well head, this Model "1100" is the most versatile gas regulator in the business. It gives a wider range of flow control in industrial, commercial or distribution installations. Just look at these points of superiority:

wider application
Inlet Max.—400 psi. Outlet Range 1" to 150 psi. Size—2" only, screwed, flanged 125 or 250 ASA

greater capacity
24,000 cfh at 10 psi to ounces; 114,000 at 100 psi. Body contoured for flow

easier maintenance
Regulator or pilot can each be serviced without disturbing the other. Easily accessible orifices in both, quickly renewable

simpler installation
Only one connection required. No complicated pins or toggles to adjust

the heart of model 1100

TYPE 51 VARIABLE PRESSURE PILOT

- Unitized construction—valve lever and orifice as a unit are removed from the outside, without disturbing balance of assembly. The likely trouble spot, the orifice, is outside where you can get at it quickly. No internal tubes to clog.
- Twin diaphragms remove as a unit
- Internal relief unit—guards against overpressure
- Spring unit—remove three screws to change springs
- Built for service
- Used for accuracy

Write for bulletin 1100

ACCURATE CP MFG CO DEPENDABLE

Chaplin-Fulton

MANUFACTURING COMPANY

Pittsburgh 25, Pennsylvania

only $5940

FOB factory, plus freight and taxes. Price includes power-steering ($150 value) and 8-speed shuttle transmission ($225 value).

It pays to LOOK TWICE before you buy a power-digger

Before you make any commitments on new excavating equipment — for installing service connections, repairing pipeline leaks, digging bell-holes, backfilling, etc. — it will pay you to investigate the performance and economy of the *job-proved* Case "320" backhoe-loader.

For here is a heavy-duty *industrial* tractor on rubber that can drive anywhere, anytime, at 17.6 MPH . . . *dig up to 90' of 4' trench per hour* . . . turn around and handle all backfilling and cleanup with the same machine and same operator. So you save investment, save operating cost.

Job records prove this rugged Case rig not only outperforms ordinary light-duty diggers mounted on converted farm tractors (see comparative chart). It also outproduces much larger truck-mounted machines on a "cost-per-job" basis. In addition, you gain the added advantage of *only one warranty, one service source, for the complete machine.* See your nearest Case Industrial Dealer, or mail coupon for complete story.

Value Comparison Chart

Feature	Case "320" Backhoe-loader	Tractor "A" w/Backhoe-Loader "X"	Tractor "B" w/Backhoe-Loader "Y"
Backhoe			
Digging depth	12'6"	12'	12' (a) 13' (b)
Loading height	10'7"	9'2"	8'
Hydraulic foot swing control	YES	NO	NO
Pump capacity	19 GPM	13 GPM	12 GPM
Loader			
Bucket capacity	13 cu. ft.	9 cu. ft.	11 cu. ft.
Lift capacity	3100 lbs.	1200 lbs.	1500 lbs.
Self-leveling bucket	YES	NO	NO
Tractor			
Engine displacement	148 cu. in.	172 cu. in.	134 cu. in.
Front axle	1 piece Forged Industrial	3 piece Agricultural	1 piece Industrial w/spindles
Shuttle transmission	YES	NO	NO
Power-steering	YES	NO	YES
Travel speeds, MPH Forward	(8)1.6 to 17.6	(5)2.1 to 11.21	(6)1.18 to 12.96
Reverse	(8)2.0 to 21.8	(1)3.6	(2)1.57 to 6.29
Tires — Standard Front	7:50-16 (6 ply)	6:00-16 (4 ply)	6:00-16 (4 ply)
Rear	13-24 (6 ply)	10-28 (4 ply)	11-28 (4 ply)

Above data based on latest specifications available to us at time of printing.

Clip . . . mail

J. I. CASE CO., Dept. A1398, Racine, Wis., U.S.A.

☐ Send full details on Case "320" backhoe-loader.
☐ Send name of nearest Case Industrial Dealer.

Name..... Position.....

Company.....

Address.....

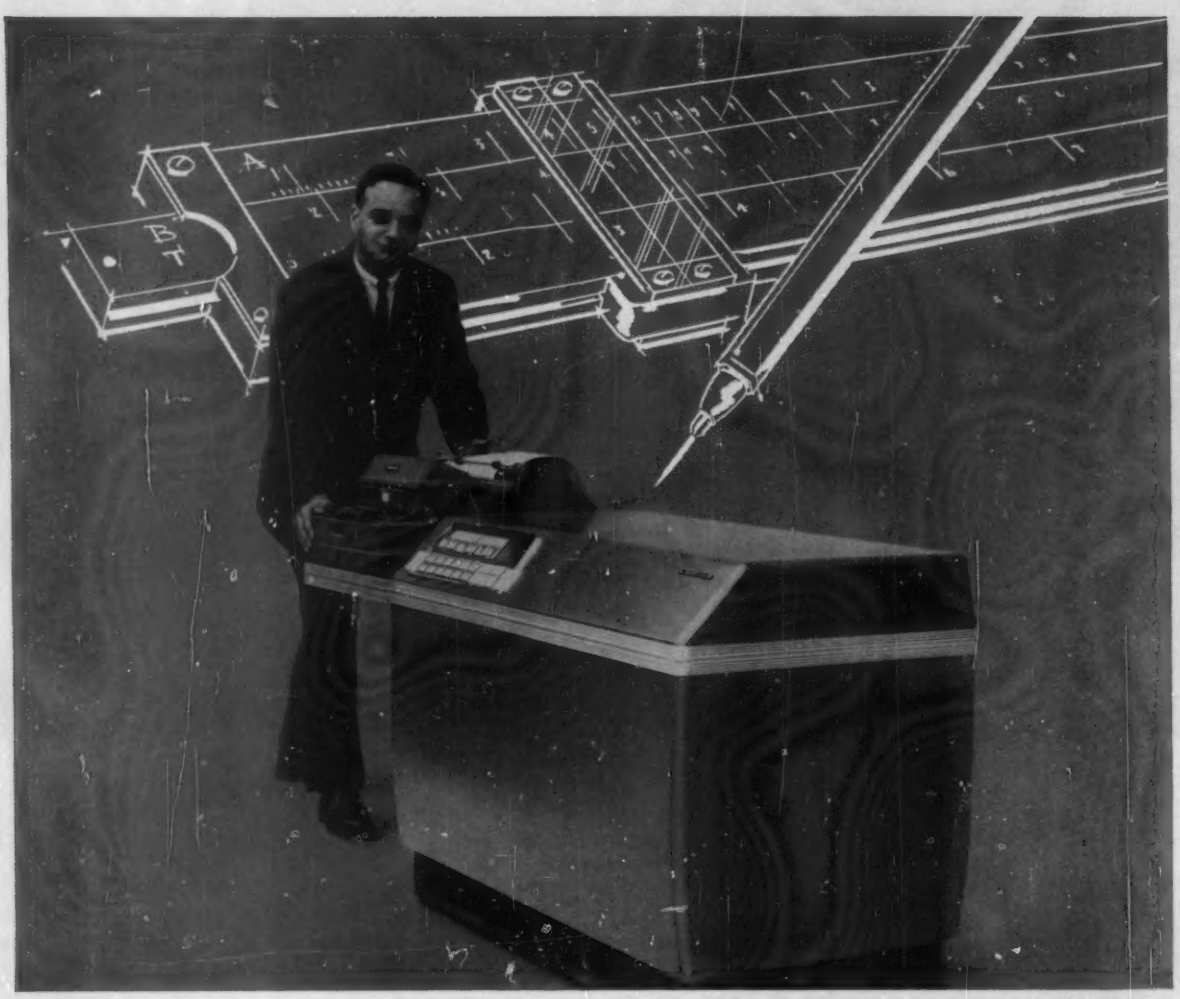
City..... State.....

CASE INDUSTRIAL

1st in quality for over 100 years

C-BL-126

Industrial wheel and crawler tractors • loaders • dozers • backhoes • fork lifts • engines



Now! On-site linear programming at high speed with this powerful electronic computer

ROYAL PRECISION LGP-30

Here's the mobile, stored-program electronic computer with large capacity...direct print-out of answers

Compact, completely mobile . . . Royal Precision LGP-30 will today furnish you with high-speed electronic computation *wherever you want it* — give you more time for *creative* engineering. And at the lowest cost ever for a complete computer system!

Unusual capacity. Operating from any convenient wall outlet, the self-cooled LGP-30 allows you to work your linear programming *on site*. Used *right at your desk* for any other problem, LGP-30 gives you the greater flexibility of stored-program operation...speed, memory (4096 words) and capacity comparable to equipment many times its size and cost. (In one application, for instance, LGP-30 handled a linear program with as large a matrix as 46 x 27.) Answers are printed out directly in a format which requires no deciphering.

Simple to operate and program. LGP-30's controls are so simplified, even non-technical personnel are quickly trained. Programming is easily learned. A library of sub-routines, plus programs for a wide variety of applications, are available.

Wide scope of gas industry applications. Among the many jobs for which LGP-30 is today being widely used in the gas industry are: distribution network analysis by Hardy Cross method, load forecasts, pipeline problems, analysis of gas field production, pumping scheduling, pipe stress analysis. LGP-30 can also supply information for better management controls.

Exceptional value; complete service. Smallest initial investment ever for a complete computer is combined with low operating and maintenance costs. Service facilities are available coast-to-coast.

For further information and specifications, write Royal McBee Corporation, Data Processing Equipment Division, Port Chester, N. Y.

ROYAL McBEE

WORLD'S LARGEST MANUFACTURER OF TYPEWRITERS AND MAKER OF DATA PROCESSING EQUIPMENT

GAS

JANUARY 1958

TRENDS

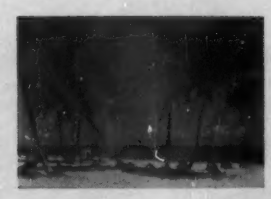
for '58 in . . .

GAS UTILIZATION—Page 44

Trends in gas utilization will be most obvious and spectacular in the domestic field. This is to be expected as it is the field in which people are most demanding, and in which they are best able to judge the merits of competitive equipment. General trends in all gas appliances are toward increased speed, more automatic operation, reduced size or required space for a given job or Btu input, improved quality, and even greater safety.

KITCHENS—Page 49

Keeping up with the exacting demands of the modern homemaker is one of the jobs lying ahead for the gas industry. More and more the prospective home-buyer is being swayed by the kitchen, with its clean and bright appliances, spaciousness, and "center-of-attraction-and-action" atmosphere. In 1958, the trend will be toward custom-tailored kitchens. They just won't look good, they'll be good. The '58 kitchen will feature speed and ease of operation.



MARKETS—Page 53

The natural gas industry is continually growing. It has established a trend since World War II of ever-increasing expansion to find and develop new markets for its products. In 1958, natural gas will invade Florida, the nation's last undeveloped gas frontier. Completion of the pipeline in the fall will bring about the start of a revitalization of Florida's gas distribution industry, now dependent upon manufactured or LP-air gas.

REGULATION & LEGISLATION—Page 58

Trends and expectations in utility legislation and regulation become important to the investors, employees and customers of an industry as large and fast-growing as the gas business. In the coming year, it is expected that the importance of incentives to discover more gas to meet the amazing demand will get more attention from regulatory bodies than in recent years. Rates of return higher than last year will be allowed by commissions.

TRENDS for '58

IN GAS UTILIZATION

Spectacular changes due in domestic appliances

GAS staff report

THE trends in gas utilization are most obvious and spectacular in the domestic field. This is to be expected as it is the field in which people are most demanding —in which they are best able to judge the merits of competitive equipment—and in which advertising and salesmanship have the greatest opportunity and impact. It cannot be said, however, that the domestic field is the one in which competition is the keenest. Electrical commercial equipment, particularly in hotel and restaurant cooking appliances, is equally competitive, and in the industrial field the kilowatts are as aggressive as ever.

The general trends in all gas appliances are toward *increased speed, more automatic operation, reduced size or required space for a given job or Btu input, improved quality* and *even greater safety.* The gas industry, both utilities and manufacturers, are taking a more and more aggressive attitude, which gives assurance that research and promotion will keep gas in the forefront.

• Domestic cooking appliances

The gas range will undoubtedly continue its development into a variety of shapes, forms and components. Color will continue to be important. Basically, automatic devices will continue to gain favor. Automatic ignition will be generally adopted in anticipation of the AGA requirement that will make it mandatory for enclosed burners after Jan. 1, 1959. Top burner temperature controls have already gained public acceptance and will appear on more burners. Roasting thermometers that will turn off the gas when the roast reaches the desired temperature, and rotating barbecue spits in broiler sections will be more generally supplied.

The evolution of the divided cooking sections has already produced a bewildering selection of "built-ins," "drop-ins," "tilt-ins," "stack-ons," high oven-broilers, very wide ovens (as wide as 26 in.), etc. It is also becoming conventional to install decorative, forced-draft ventilation hoods over top cooking sections. These trends will continue and with them, the increasing practice of supplying built-in, pre-selected cooking appliances with the "tract" or speculative house. Manufacturers are

Trend in 1958 will be toward more installations of built-in all gas kitchens. Picture at left shows built-in range top section and built-in oven, in separate units, by Tappan. At right is Western Holly's built-in "Kook Center."

exploring two possibilities in this connection: (1) the design of a top built-in section that will be complete within its casing and easily installed to require a minimum of carpentry planning and care, and (2) standardization of overall casing dimensions so that standard openings can be provided by the builder, and the house purchaser thereby be given some option in selection and replacement of models.

A most recent development is the Kook-Center treatment in which a top section-oven-broiler range is enclosed in an assembly combining a utility shelf and a powered-draft-ventilating fan. This is, to some extent, a return to the conventional, but it makes a convenient and space-saving installation, particularly adaptable to remodelling or replacement.

Trend toward more extra features will be pronounced in ranges this year. For example, Hardwick range (above) features top burner thermostat and rotating spit in broiler. Commercial equipment, too, is improving. Shown at right is the Delfran Char-Glo broiler. Below is Mid-Continent's Ember-Glow commercial broiler.

● Domestic and commercial "charcoal" broilers

With the trend toward charcoal broiled food, several horizontal gas-fired broilers have been developed, and other designs will no doubt follow. These appliances simulate the appearance and effect of a horizontal charcoal bed, but eliminate the slow heat-up, lack of heat control, and handling difficulties of real charcoal. Essentially they consist of a horizontal burner assembly above which is a layer of black ceramic shapes to simulate the charcoal. Above the ceramic layer is a bar grate on which the food is spread and barbecued. In one design, the whole grate assembly can be tilted to direct grease into a receptacle rather than have it drop on the "charcoal." The tilt also makes it possible to place the thickest pieces of meat farther away from the heat and thus cook thick and thin cuts simultaneously. Another design controls the height of burning grease flames by jets of air blown horizontally between the "charcoal" and the grate. At least one model incorporates rotating spits. These assemblies can all be built into counter tops.

● Domestic water heaters

There are two trends in domestic water heaters. One is toward greater deliverability of hot water,

Complete kitchen packages, such as this one by Mayfair, will be in style during 1958. This packaged kitchen features all gas appliances, and non-competitive electric ones.

i.e., a combination of storage capacity and recovery to ensure adequate volumes of hot water delivered over a several-hour period to supply the normal demands of a household with dishwasher and clothes washer. The time appears near when a minimum sizing of 30-gal. storage with about 40,000-Btu/hr input, or 40-gal. storage with about 30,000-Btu/hr input, will be generally adopted. There is increasing accent on "glass lined" tanks.

The other trend, to meet home and kitchen design planning rather than in the functional interests of speed and efficiency of water heating, is toward counter height or "table top" models. These can be installed under a counter or work top in the kitchen.

● Clothes dryers

Clothes dryers have not changed a great deal in overall design during the past year. They generally follow the rotating-drum principle with front loading and unloading. At least one design has recently appeared with top loading and unloading; the opening is a door in the drum which coincides, by means of a stop, with another door in the top of the cabinet.

There is a trend toward combination washer-dryers, impelled principally by the desire to save space. At least one combination water heater - washer - dryer has been developed; it includes a water heating tank with 18,000-Btu/hr input to temper or boost the temperature of the normal hot water supply.

● Incinerators

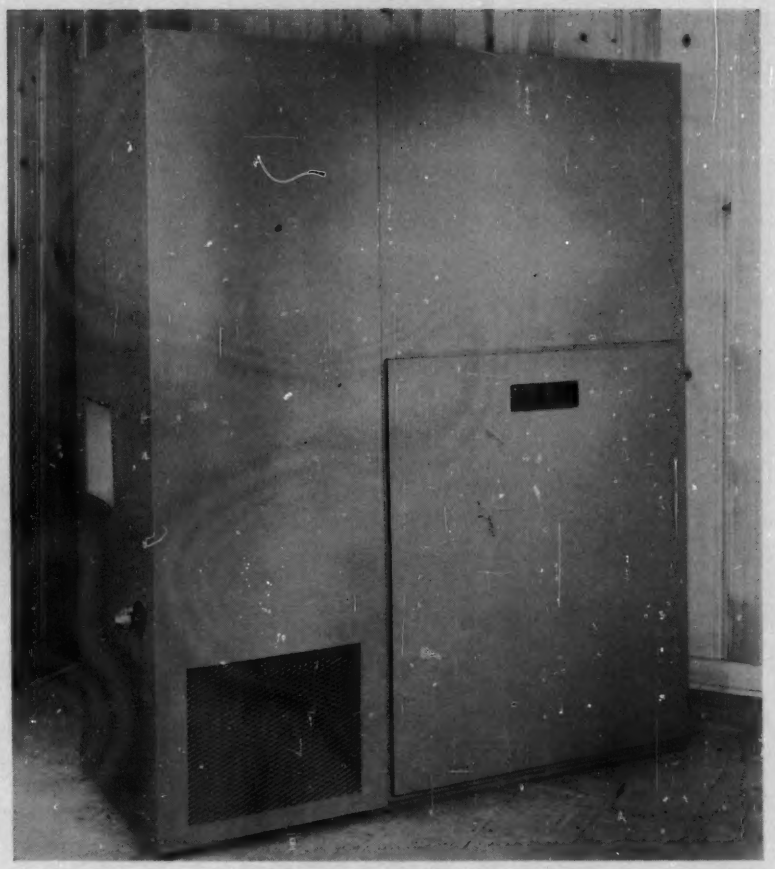
Gas-fired domestic incinerators are currently going through a major re-vamping and improvement. This has resulted from the need to comply with tightening performance specifications of air pollution control authorities. AGA requirements have been extensively revised and made effective Jan. 1, 1958, and manufacturers are already in initial production of models that comply and are substantially smokeless and odorless. This has been accomplished through the general design principles of downdraft in the primary combustion section, settlement of particulate matter in a bottom chamber, and consumption of smoke and odors by flame in the updraft "afterburner" section. The total gas input—primary and secondary combustion sections—will apparently be about 30-40,000 Btu/hr.

● Complete kitchen package

Another trend toward the furnishing of appliances as part of a new house is the complete kitchen package of gas and non-competitive electric appliances. Such a package typically consists of gas range sections, ventilating hood, refrigerator, water heater, incinerator or garbage disposal, dish washer and clothes dryer, sink, counter tops and cabinets.

• House and room heating

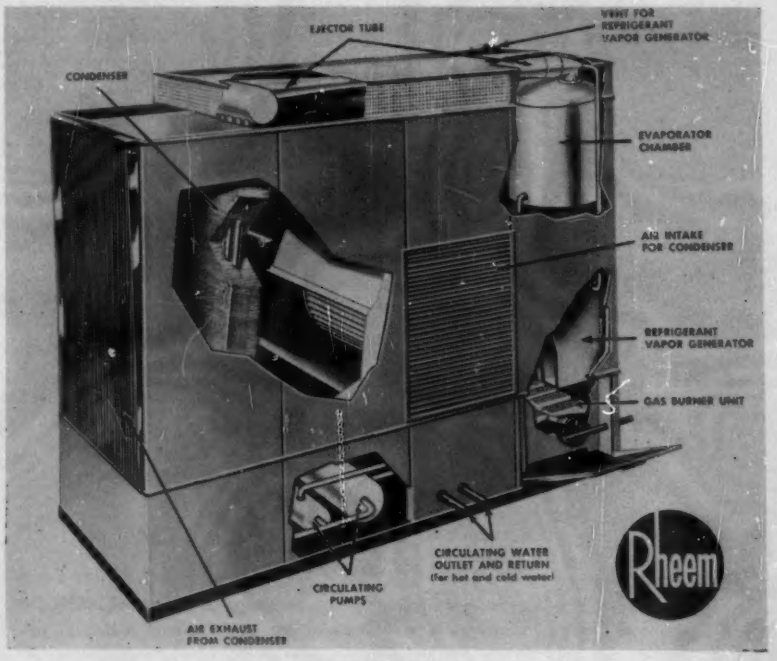
With the trend to smaller houses and slab-floor construction, the heating appliance evolution is away from floor furnaces and toward vented recessed (wall) heaters and attic furnaces, so that a minimum of floor space is occupied. In medium-size houses, forced air furnaces, in minimum size closets or alcoves, are also popular. The overall trend confronting all house-heating appliance manufacturers is to get more heating capacity out of a smaller appliance that can preferably be placed (sides and back) flush against its surrounding walls. This rather obviously requires great ingenuity, tends to closer assembly and clearance within the appliance, and in general complicates the problems of maintenance and servicing. Particularly in large houses, wherein some portions are more difficult to heat than others, or different temperatures are desired in different portions, zone control heating is rapidly coming into favor. (See GAS, October, November, December, 1957.) In houses where initial zone control would have been effective because a remote room or area is difficult to heat, or in the case of an added room or enclosed porch, appliances to furnish local auxiliary heat also are coming into demand.



A trend toward more widespread use of gas air conditioning is seen for 1958. The new 5-ton Arkla-Servel unit is shown above, and is now in production. Below is the Rheem gas air conditioner, which is still being field tested. It is expected on the market this year.

• Domestic air conditioning

The trend to summer cooling for domestic dwellings, and the obvious desirability of developing all-year (summer cooling and winter heating) gas-fired appliances for this purpose, have been repeatedly stressed in gas industry conclaves and publications. The market for air cooling apparatus is accelerating, and it appears that gas appliances are preparing to satisfy it. The continuance of the Servel all-year units, under the Arkla-Servel banner, has been widely publicized. AGA research, both basic at the AGA Laboratories and several research institutes, and in cooperation with various potential manufacturers, is working along a number of different lines. Production units are promised in the near future. At least three modifications of the absorption refrigeration principle are said to be nearing



practical usefulness. Several engine manufacturers are designing long-life, trouble-free, gas-fueled internal combustion engines which can power compression refrigeration apparatus—or heat pumps, if need be. A "jet" powered system is on field trial. Possibilities of the free piston engine are also being explored.

● Commercial cooking equipment

In the commercial utilization field there is an aggressive trend toward modernization and general improvement of hotel and restaurant cooking equipment. One evidence of this is the strengthening of AGA Requirements which, effective Jan. 1, 1957, required automatic ignition and safety pilots on all ranges, portable bake ovens and roast ovens, deep fat fryers, and counter appliances with enclosed burners.

Manufacturers of equipment are producing increasingly improved models, both through their own research and by taking advantage of AGA research. Open top burners have been doubled in input and speed, and have great flexibility in turn-down, without sacrificing efficiency. Hot tops, fry tops and even-heat tops have been improved in speed and control. Bake ovens have been developed, with forced circulation over the cooking load, which has speeded cake baking from 30 minutes to 15 minutes and reduced moisture loss and shrinkage. Also muffle-type ovens have been designed to give very even heat distribution, and permit conservation of heat when loading and unloading.

In overall design, several manufacturers are offering a modular series of units so that any combination of top sections, ovens, and broilers, can be assembled and added to as desired. Such arrangements result in convenience and flexibility of use, easy cleaning and sanitation, and business-like appearance.

It appears probable that commercial equipment will continue to become more automatic, following the trend of commercial ranges, so that models will soon be equipped with top burner temperature controls, roast thermometers, etc.

● Venting

As the result of both manufacturer and AGA research, there will be progressively better design and installation of vent components—draft hoods, flues and flue cowls. There is a trend toward venting two or more appliances into a common flue, with the ultimate being to vent all appliances into a single (common) outlet.

● Outdoor Installations

Consistent with the desire to save space within buildings, serious consideration is being given to the installation of certain appliances, such as water heaters, incinerators, and furnaces, outside the building. This is requiring appraisal of the problems of jackets to protect from the elements, and wind resistance to prevent pilot and main burner outage and malperformance of the vent.

● Combination controls

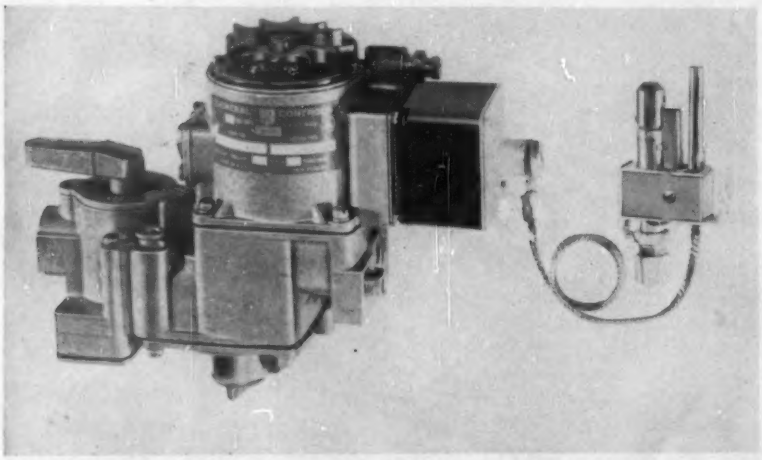
In the control and accessory field, manufacturers are showing considerable ingenuity in the development of combination controls. These assemblies include all or part of the following: pilot and main manual shutoff valves, automatic control valves, safety pilots, pressure regulators and dust filters.

● Electrical components

Many gas appliances, desirably rather than unavoidably, incorporate electrical components of lights, motors, transformers, switches, junction boxes, outlets, wiring, etc. During the past year it has been realized that it is essential that these components meet the standards of the National Electric Code and the Underwriters Laboratories; and that compliance is the responsibility of the gas industry through the AGA Approval program. In accordance with this, requirements have been put into effect for ranges and central heating equipment, are being prepared for clothes dryers, and will soon cover all appliances having electrical components.

● AGA approval requirements

AGA Requirements, dedicated to the promotion of safety, durability and efficiency of gas appliances, have always exercised reasonable caution in considering new developments, but have also made every effort to avoid delay, and stifling of ingenuity. The new developments, particularly in ranges and central heating appliances, are coming so fast that they are taxing terminology and classification, much less the technical requirements details. The Requirements organization is meeting this situation by subdividing the appliance classification; holding more frequent meetings of its subcommittees; appointing panels, regional working committees, and task groups; resorting to letter ballots; and expediting testing and consideration of important items. ■



Another trend for 1958 will be greater use of combination appliance controls. This unit, made by General Controls, combines several functions into one compact unit.

Originality and attractive decor for kitchen-dining areas (top) will be emphasized even more in 1958, as will the use of built-ins (below). More flexibility is possible with twin top-burner units shown here.

Kitchen demands: Speed, economy, custom-built look

By **BARBARA HALL**, Assistant Editor

KEEPING up with the exacting demands of the modern homemaker is one of the jobs lying ahead for the gas industry. More and more the prospective homebuyer is being swayed by the kitchen, with its clean and bright appliances, spaciousness, and its "center - of - attraction - and - action" atmosphere.

Do today's homemakers like the current trends in the design of modern gas appliances? The 49 finalists in the Mrs. America contest—today's outstanding homemakers—do. They approved unanimously when questioned. And what these outstanding women want in their homes and kitchens is a reflection of what the millions of other homemakers want: automatic features, speed, convenience, beauty, capacity, ease of cleaning.

Meeting these demands will be the task of the gas industry and gas appliance manufacturers in 1958.

To meet the demands of the homemaker, and to accommodate the varied types of foods now available—frozen, packaged, and the like—tomorrow's kitchen will take on a new face.

In 1958 there will be an increased emphasis on originality and attractive decor for kitchen-dining areas. These same areas will be enlarged to provide more storage space, more convenient work patterns, and better integrated family living.

Custom - tailored kitchens will come into their own. And kitchens in home-development sections will offer a custom-tailored look that will sell the whole home. Kitchens

GAS staff report

Milwaukee Gas Light has a staff of specially trained home service advisors working out of the kitchen-planning office shown at left. This staff gives an additional push to the trend to more careful kitchen planning.

. . . Individualized design

just won't look good, they'll be good. Kitchens will be remodeled to fit a particular family's needs.

At a major eastern utility, and just for the asking, a home service advisor will visit a homemaker, study her working habits, and then suggest a kitchen arrangement that she feels is best suited to the prospect. Does she have a family who enjoys eating out-of-doors? Then a rotisserie should be included in her kitchen to provide the charcoal taste of outdoor cooking. Does she do considerable baking? Then maybe the oven should be placed in a spot more convenient to counter-tops used for serving areas.

In the coming year the use of colored and stainless steel finishes will continue their upward swing. While white continues to outsell color, it seems evident that color is here to stay.

Making its mark in 1958 will be the all-gas *completely packaged* kitchen. Its appeal to the builder and homemaker is obvious. And competitively, it's a sharp answer to the electric industry. Today's development builder faces a tough problem—he, to keep costs down,

Remodeled kitchens are taking on the individualized look demanded by homemakers. East Ohio's home service department goes into the home with the kitchen planning kit shown here to help the homemaker match her individual needs and desires.

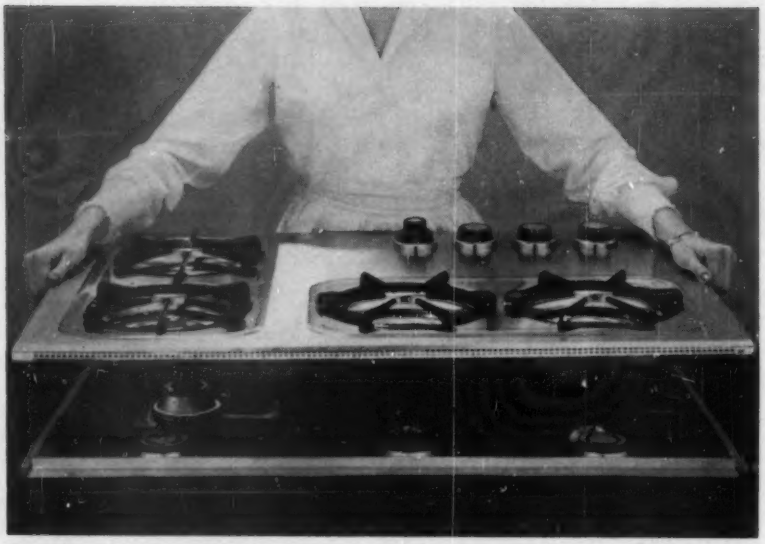
must standardize. But the buyers want individually styled homes. They're tired of all-the-same housing. The packaged kitchen will give the builder a chance to sew up the kitchen in one easy move. And, for the homeowner, there is nothing with a more custom look than a completely packaged, all-gas kitchen with its matching cabinets and appliances.

The modern kitchen should be seen. It should not be a behind-the-scenes hideout. Its uncluttered appearance and spaciousness will be enhanced by its close association with the family living area. As the control center of the home, the kitchen is becoming more and more important. And with this, what goes into the kitchen naturally becomes more and more important.

More demands will be made on the ingenuity of appliance designers, manufacturers, merchandisers and utilities to please the homemaker.

More fully automatic features in appliance operation will put in a 1958 appearance. For example, there will be a demand from the public for more than one thermostatic top burner. A home service

. . . Custom-built look



The 1958 gas range will offer the housewife even more easy-to-clean features, such as this lift-off top.

director from a large Michigan utility says that a minimum of two thermal-eye burners would please homemakers, indicating their enthusiasm for this feature.

The built-in star will continue to rise in 1958. Their popularity with both builder and homeowner has not slowed down since their introduction. Their flexibility and attractiveness are hard to beat. And this, coupled with the increased use of convenience features formerly found only on free-standing ranges, should keep the built-ins on the right road in 1958. The free-standing range, unwilling to relinquish its hold, will take on a built-in look.

Bringing the outdoors into the kitchen with the oven rotisserie won't diminish in 1958. There will also be a decided trend to the use of separate rotisserie-style broiler compartments.

Built-in meat thermometers are here to stay. Built-ins will offer larger ovens and the use of double ovens will increase, along with the demand.

In the crystal-ball stage, according to reports, are extra-fast ovens. One of these experimental super-speed ovens baked a cake in 7¾ minutes, almost a 75 per cent decrease in baking time required in a conventional oven.

The homemakers' demands for easier to clean ranges will be answered with an increased use of disposable oven bottom liners and burner bowls made of aluminum foil; cooking tops which lift up or off; fewer seams, grooves, knobs. This latter trend applies not only to ranges and appliances but to kitchens as a whole.

The trend to higher quality won't slow down.

As one home service director puts it, "Initial happiness disappears quickly when the bargain price is forgotten but poor performance isn't." Still higher standards will be the form for '58 to avoid the hiding of poor quality beneath a glittering exterior. ■

The completely packaged all-gas kitchen—including cabinets—will hit hard in 1958. Welcoming it will be the gas industry, appliance manufacturers, builders, and homemakers.

Natural gas will invade nation's last 'undeveloped' frontier

By DON WRIGHT, Managing Editor

THE natural gas industry is continually growing. It has established a trend since World War II of ever-increasing expansion to find and develop new markets for its product.

Many thousands of miles of pipelines now stretch from the gas production fields of the Southwest to nearly all major population centers of the United States. Some of these lines have been in operation for 30 years or more. Others have been operating only a short time.

One major U. S. population area is still without natural gas service. This is the state of Florida.

And, Florida is the hitherto-unserved market that will be developed by the natural gas industry in, substantially, 1958.

After nearly a decade of proposals and counter-proposals, construction crews are getting ready to start building a pipeline which will bring natural gas from Texas to a majority of Florida cities.

This pipeline will make natural gas available in the peninsula of Florida for the first time. It will mark the fulfillment of a need which has been felt throughout the state for a long time. It will reduce considerably the area's now nearly total dependence on oil products for all forms of commercial energy.

The arrival of natural gas in substantial quantities will start several trends throughout the state. It will:

1. *Start a* complete re-birth of the gas distribution industry and cause a trend toward the increased use of gas as a domestic fuel.

2. *Spur an* industrial revitalization which state officials feel will boost Florida high into the manufacturing class.

3. *Replace fuel* oil and other types of energy as the most economical and efficient form of commercial and industrial fuel.

Natural gas will reach Florida later this year through the joint efforts of two pipeline companies: Coastal Transmission Corp. and

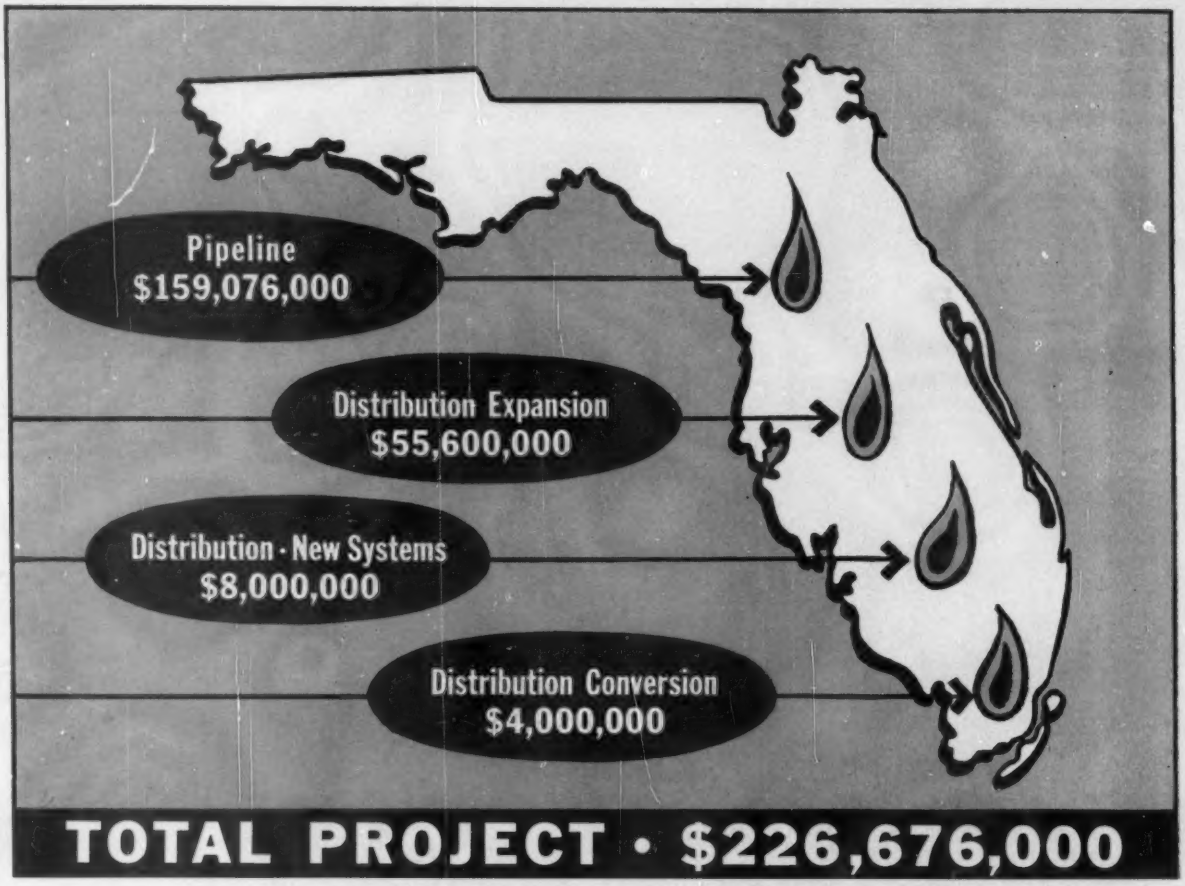


Fig. 1. Here's how the $226,676,000 will be spent to bring natural gas service to Florida.

Houston Texas Gas & Oil Corp. The Coastal-Houston pipeline will run from the Rio Grande valley of Texas to a point south of Miami, Fla.—a distance of 1417 miles.

It will take a lot of money to provide natural gas service to Florida. In all, $226,676,000 has been budgeted by pipeline and distribution companies connected with serving natural gas in Florida. *Fig. 1* shows how this money will be spent.

Today, 18 manufactured and LP-air gas distribution systems operate in the territory which will be served by the new pipeline. These 18 companies (15 private, 3 municipal) serve 271,000 customers. Most of the systems are antiquated, their costs of operation high. They are running far behind in competition with other energy sources.

By this fall, these 18 systems, plus 16 new ones that will be built to serve communities that are not now piped, will have a commodity that can be sold competitively with other fuels and power. They can—and will—launch aggressive campaigns to gain new customers, and encourage present ones to increase their use of gas.

The Coastal-Houston pipeline will have an initial daily average capacity of 275 MMcf. About half of this volume will be available to distribution companies, and to direct industrial accounts. The remainder will be transportation gas, transported by the pipeline for two large electric utilities.

While the initial re-sale capacity is not large when compared with the volumes used in many of the more gas-accustomed areas of North America, it is huge in comparison to the amount of manufactured gas now being marketed in Florida. This means that, for the first time in years, Florida's gas distribution companies will have abundant supplies. They can start looking for new customers and increased loads.

And, for the first time, these distributors will have a fuel which can be priced competitively with fuel oil and other forms of energy.

The average cost of producing an Mcf of either manufactured or LP-air gas in Florida is now $1.20. Natural gas purchased from the pipeline by the distribution company will cost 54 per cent less—$0.55/Mcf—on a firm basis. Interruptible gas is even cheaper, $0.33/Mcf, a savings of 73 per cent over the manufactured or LP-air gas production costs.

Naturally, these savings will be passed along to the consumer. In those areas now served with some form of piped gas, there is a market ready and waiting—but it must be sold. *Fig. 2* shows the percentage of dwelling units which use gas for cooking and space heating in seven selected Florida cities. Present forms of piped gas are more than holding their own for the cooking load, with chief competition coming from electricity. LPG and oil (chiefly kerosene) follow in that order. In space heating, though,

the expensive piped gas is running far behind kerosene and No. 2 fuel oil. About one-fifth of the homes surveyed were reported as not heated, but it is safe to assume that most of them had some form of small portable electric heating equipment.

By year's end, natural gas will be by far the cheapest fuel for cooking, space heating, and water heating. *Table 1* shows the comparative fuel savings for domestic consumers using natural gas in comparison with other types of fuel for the same purposes.

These fuel savings should bring about a trend to modern gas appliances in new homes that will be built in areas where natural gas service will become available this year. It also could well bring about a trend to conversion of many non-gas appliances to gas-fired ones by residents of present dwellings. And the replacement market is large.

Biggest field for rapid conversion in existing dwellings appears to be in heating equipment. Electric heaters are expensive to operate. Many home owners will feel justified in junking an electric heater in good operating condition for a new gas-fired heater on basis of fuel costs alone. Existing LPG appliances generally can be converted to natural gas. However, many home owners are expected to take advantage of the fuel change for purchasing new natural-gas heating systems.

It is doubtful, however, whether such items as electric water heaters, electric ranges and kerosene and oil space heaters will be replaced with gas appliances until they wear out or become obsolete.

New homes and apartments should become a lush market for gas appliances, and gas load. Based on Florida's expected growth to 7 million population by 1970, the state will need some 44,000 new dwelling units each year for the next 13 years. It is safe to assume that 80 to 85 per cent of these will be built in areas which will be served by natural gas. Each new unit is a potential market for a gas range, gas water heater, gas space or central heating unit, and gas refrigerator. Gas incinerators and gas clothes dryers also will have a definite market here.

Florida's warm—and often sticky—climate, which hampers the space heating load, conversely makes it an ideal area for air conditioning. At present, cost of gas has made it all but impossible to sell this equipment.

Arrival of natural gas could easily make this area an excellent market for gas home air conditioning. A coordinated effort between manufacturers and gas companies could well develop the air conditioning load, and provide the distribution companies with a badly needed summer load.

Summer load is something that must be developed if the gas industry in Florida is really to prosper. One of the major roadblocks to bringing natural gas to the state has been the peak load problem caused by occasional cold snaps. A trend toward use of gas air conditioning can be the answer to the summer load loss problem. The air conditioning load might exceed that from space heating in the years to come.

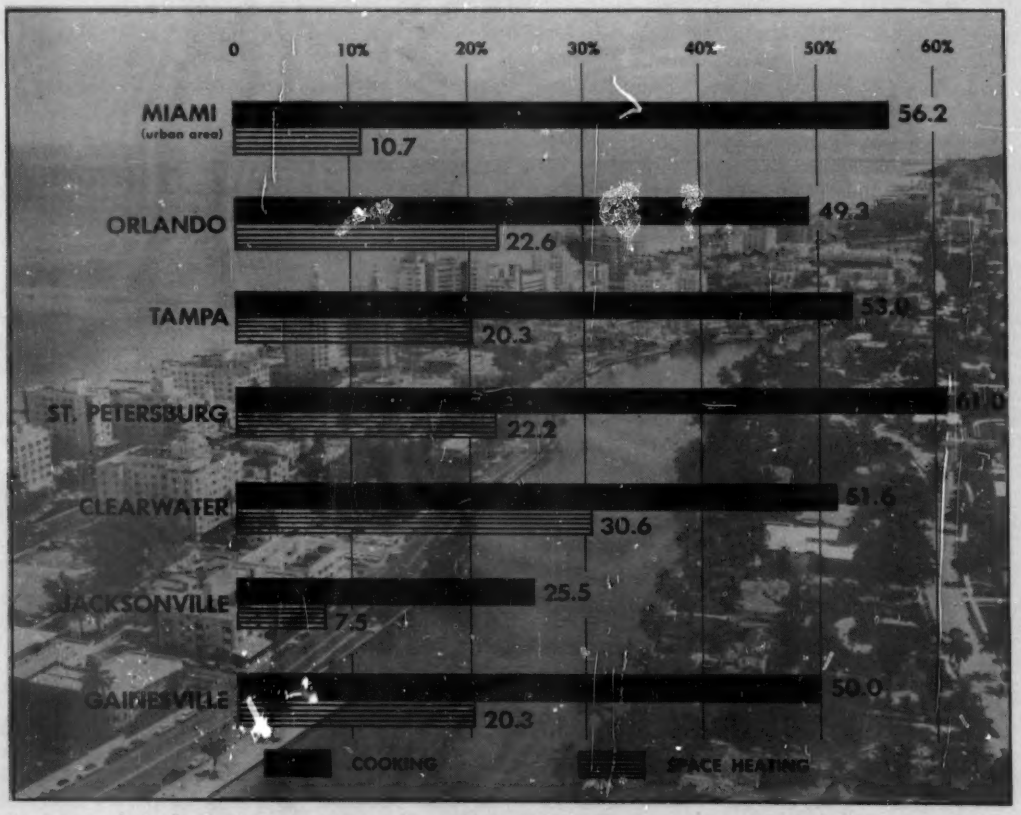


Fig. 2. Percentage of dwelling units now using gas for cooking (solid bar) and space heating (shaded bar) in seven Florida cities.

TABLE 1. Estimated average percentage savings through use of natural gas in households in selected Florida cities

Savings compared with—	Clearwater	Miami	Lakeland	Jacksonville	Ocala	St. Petersburg	Orlando
Manufactured Gas:							
Cooking	16.0	....	....	34.7	3.8	7.3	....
Water heating	31.0	....	....	33.8	3.8	40.0	....
Cooking and water heating	....	15.0	30.0	36.3	....	25.6	41.3
Space heating	....	45.0	32.2	38.8	....	45.1	45.1
Cooking, water and space heating	17.0	....	....	....	6.9	29.4	....
LP Gas:							
Cooking	....	....	....	16.7	....	....	....
Water heating	....	....	....	24.0	....	....	....
Cooking and water heating	34.8	30.7	33.3	33.0	8.7	23.9	46.4
Space heating	....	56.6	49.2	38.0	....	....	41.4
Bottled Bulk	....	....	....	1.2	....	....	....
Cooking, water and space heating	19.6	....	....	....	23.2	25.8	....
Fuel Oil:							
Space heating	....	....	4.8	....	....	....	....
Number 1	13.3	....	....	....	26.4	21.1	7.5
Number 2	8.8	....	....	....	21.5	16.6	....
Electricity:							
Cooking	37.5	....	....	3.3	34.9	37.5	....
Cooking and water heating	32.9	9.9	3.7	10.8	34.0	32.9	4.7
Space heating	67.6	50.5	18.8	....	74.3	67.6	48.3

Source: Florida Development Commission

Florida's chief business today is tourism. It has been the nation's leading tourist attraction since the early 1920s, when the late Carl Byoir's public relations organization began flooding the world with publicity on Florida's sunshine. Today, the gaudy hotels on Miami Beach's Collins avenue and the somewhat more subdued but equally lush resorts of other Florida cities attract millions of visitors — visitors who have both the time and money to soak up lots of expensive sunshine.

While it doesn't intend to neglect its profitable tourist business, Florida is now making a determined bid to build its industrial economy. Civic leaders for many years have felt that the same attractions that lure tourists to the state could also bring in new permanent residents.

A look at *Fig. 3* shows how correct they were.

Florida's present population is about 4 million, compared with 3.77 million on July 1, 1956. When the last nation-wide census was made in 1950, the state had 2.77 million residents. The Florida Development Commission, an organization which is aggressively working toward building the state's industry, conservatively estimates that 7 million people will reside there in 1970.

On a nationwide population basis, Florida ranked 28th in 1940. By 1950, it had climbed to 20th. Then the big influx began—by the end of 1956, it ranked 13th, and experts predict it will rank eighth by the mid-1960s.

You've got to have more than a pleasant tropic climate to attract new residents. Of course, some of these new Floridians—now entering the state at the rate of 2600 per week—will be retired people not concerned with jobs. The bulk of the newcomers, however, will be jobholders or jobseekers.

World War II played an important role in the migration to Florida. During the war, the Army built many training camps and air bases there. Ex-servicemen returned to homes in colder climates, remembering only the warm weather. Forgotten were the miseries of basic training in such spots as Camp Blandings. Many of these ex-GIs decided to move to Florida. Today, they are still returning. As more jobs become available, the migration will speed up.

An increasing population means an increasing labor market. And, a growing labor supply is one of the ingredients an area must possess to build a healthy industrial economy. The others: water, transportation, economical energy.

Water is a prime industry requirement. And, Florida has a seemingly limitless supply of it. Dr. A. P. Black, a University of Florida chemistry professor, puts it this way: "Florida's natural water resources are exceeded by those of no other area of equal size on the American continent."

Florida has the highest potential of pumpable water of any state. Its 68 major springs alone provide a combined total of 3.6 billion gal. of fresh water daily. University of Florida engineers calculate that this amount is equal to 17 per cent of the fresh water used daily by all U. S. industry.

Transportation facilities in Florida—rail, highway, air and sea—are adequate for almost unlimited industrial and population expansion. The state has more deep water ports than any other. All that is needed to utilize the full potential of these ports is industry . . . industry to make goods for export . . . industry to utilize raw materials shipped in through these ports.

Energy is the fourth necessary ingredient. This is lacking now, but will be available by the end of the year. Natural gas will provide the needed energy, both as a fuel itself, and as the fuel used to generate other forms of energy.

This lack of an economic energy source has hampered Florida's drive to gain new industry. Manufactured or LP-air gas is expensive, and in short supply. Fuel oil is costly. Electricity, too, is generated with high cost petroleum products.

A great deal of Florida's present heavy industry is concentrated in two counties (Escambia and Santa Rosa) in the northwesternmost corner of the state. Natural gas has

been available in these two counties for several years. State leaders feel that this is a sure sign that industry will grow in other parts of Florida once the pipeline has been put into operation.

It is strongly felt that the availability of natural gas will become an important reason for industrial firms selecting Florida as the site of new plants. Expansion of existing plants because of greater fuel supplies is also anticipated.

The effects on industrial customers who switch to natural gas will be chiefly in fuel savings. Larger industrial users will be forced to maintain oil burning or other types of standby equipment, but will still find their fuel bills much lower.

In addition to spurring the growth of present industry in the state, the availability of natural gas is expected to start a trend toward new types of industry. Most likely new industries appear to be in the stone, clay and glass field. Petrochemicals also appear promising. The electronics industry is already big there.

Fuel is a major cost item in many of these industries. The raw materials to make these products are available in Florida. The market for them is there, too.

Mining of limestone and manufacture of limestone products appears to be one of the most likely new industries. Lime deposits now exist in large scale in roughly one-third of the state. Some of these are of high quality, and are suitable for chemical lime. But, only two recovery plants now are operating.

Basic operation in the production of lime is the thermal decomposition of limestone.

The year 1958 will see a definite trend toward the development of new gas markets in Florida. It also will see the start of a new industrial era in the state—an era which has been long delayed because of the scarcity of needed energy. Natural gas will furnish this energy, and be a paramount factor in the future growth of the state. ■

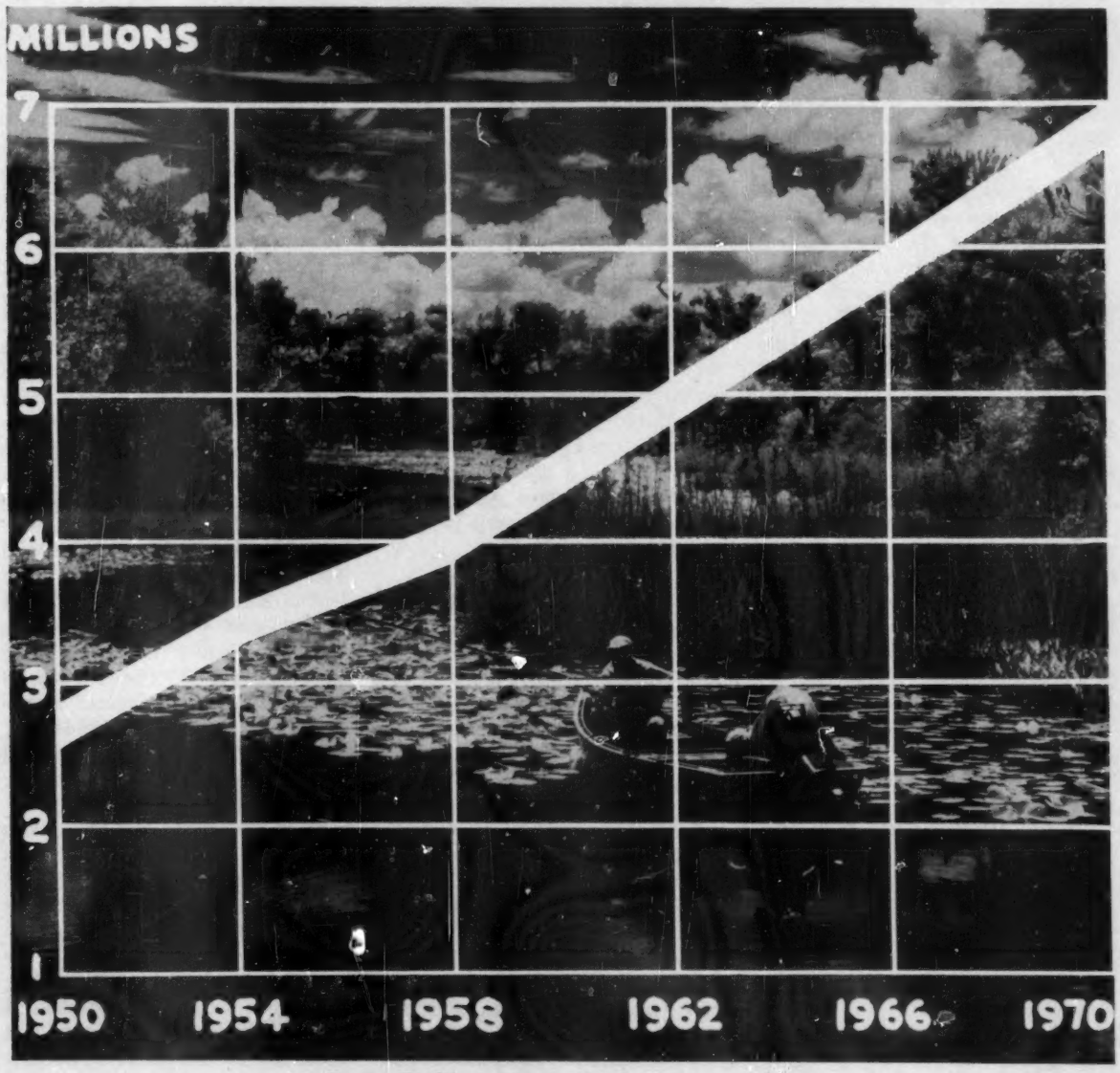


Fig. 3. Florida's growing population is shown on chart.

Gas discovery incentives will get more attention

TRENDS and expectations in utility legislation and regulation become important to the investors, employees and customers of an industry as large and fast-growing as the gas business. About three-fourths of the 170 million people in the United States are served by gas utilities. With the expected growth of a million meters a year, gas will become even more important in the future. The volume of natural gas consumption tripled during the last 10 years. Investors in stocks and bonds have a big stake in the business. Nearly $20 billion in capital entered the gas business, which makes it the fifth largest in America. From an investment standpoint, only the railroads, petroleum refining, telephone and electric industries are larger than the gas industry. To keep up with growing demands of customers another $5 billion will be needed for investment in gas companies' facilities in the next three years. Over $2 billion was spent on construction in 1957.

In the coming year, it is expected that:

1. The importance of incentives to discover more gas to meet the amazing demand will get more attention than in recent years.

2. Congress will ease the present rigid regulation of independent gas producers.

3. Inflation will cause higher prices for wages, materials and money with a resulting need for increases in prices charged by producers, interstate pipelines and local gas distributing companies.

4. More regulatory commissions will consider current rather than original cost in determining rate bases upon which to allow higher returns to utilities.

5. Many utility commissions will look forward instead of backward.

6. Rates of return higher than last year will be allowed by commissions.

GAS staff report

LEGISLATION INVOLVING UTILITIES

CONGRESS is becoming well informed about interstate natural gas pipelines, producers and consumers from many proposals to amend the Natural Gas Act. It knows that about 75,000 miles of natural gas pipelines have been certificated by the Federal Power Commission with approximately 28 billion cu ft of daily delivery capacity. In 1957 more than 100 gas pipeline companies and about 10,000 independent producers were under FPC jurisdiction. Congress is still struggling with gas legislation—a recognized subject of national concern.

Amendments To The Gas Act

From complete exemption of independent natural gas producers, proposed amendments to the Natural Gas Act have changed to partial exemption. The Harris-O'Hara amendment now before Congress is designed to give producers adequate incentives to discover more gas. The public utility type of ratemaking will be abandoned and producers' gas will be priced by FPC as a commodity on the basis of a "reasonable market price." The House of Representatives' Committee Report on the proposed amendment states that safeguards are also included to protect consumers in their interests in long-term gas supplies and fair prices.

The Harris-O'Hara Bill forbids FPC to consider costs, or to use the public utility concept in fixing producer rates. The prescribed "reasonable market price" standard requires FPC to consider (a) whether the allowed price will assure consumers a continuing ample natural gas supply; (b) whether the producer's sales price was reached competitively in arm's-length bargaining; (c) the reasonableness of all contract provisions relating to definite prices for the future; (d) the quality of the natural gas being delivered; and (e) the conditions of delivery such as pressures and volumes. In addition, FPC must consider the current level of field

prices for gas under other contracts in the same field and in other areas which contain comparable provisions. The Bill adds that the "reasonable market price" is not necessarily the price of the last sale, the highest or lowest or average price, or other price determined by the mechanical application of a single criterion. It is the price found by FPC, after weighing all revalent factors and exercising its judgment, to be the "reasonable market price."

The gas industry is showing a greater spirit of unity than in the past. Producers, pipeliners, and distributors are listening to each others' problems in this interdependent business. There is a general realization that it is essential to provide rewards equal to the risks of drilling for new gas reserves. The integrated natural gas industry is dependent upon a constant flow of that premium fuel of all the fossil fuels.

Last year natural gas production reached a record of 11 trillion cu ft, while additions to recoverable gas reserves totaled 14 trillion cu ft. The recent trend, however, in the remaining number of years of the nation's proven natural gas supply has been downward. Today, we have proven gas reserves of about 230 trillion cu ft, and the United States Bureau of Mines estimates that more than 600 trillion cu ft will be discovered and developed in the future. Congress is aware that incentives are necessary to put man's brains and machines to work to capture those future gas reserves.

One segment of the gas industry has cautioned that increases in the prices paid to producers are passed on to the ultimate consumers, and that it would be folly to price gas out of the market. The present greatest competition with other fuels is in the industrial classification of gas customers.

Contending for a balanced fuels economy, a spokesman for the coal industry has stated that the Natural Gas Act should be amended. He would prohibit sales by interstate natural gas pipelines for resale or directly to industries, which drive out competing fuels because the prices are below actual cost. He said that there is something in the Harris-O'Hara Bill for everyone except the coal industry. The coal owners will not support legislation which "would continue existing practices inimical to our own interests, deprive our competitors of none of their present advantages, and result in compounding our own disadvantage on competitive problems by making greater supplies of gas available in the energy markets."

The coal advocate points to the tremendous energy requirements of the United States. In 1946, the Nation consumed more than 23 quadrillion Btu's of energy produced by coal, gas, oil and water power. Of this total, bituminous coal supplied 56 per cent, gas 12 per cent and oil 21 per cent. Ten years later in 1956, the total energy used was about 30 quadrillion Btu's. Coal accounted for 38 per cent, gas 28 per cent and oil 26 per cent. Coal has lost a significant part of its market to gas. The spokesman for coal reminds us that the recoverable gas reserves have an indicated life of 22 years, and that oil reserves will last 12 years, while coal will be available for 1000 years at present rates of consumption. He concluded with this warning: "Invasion of coal's traditional markets by natural gas and imported crude and residual oils, stemming from existing competitive advantages, have had an adverse impact on coal's economic position. A continuation of the trend will further the economic squeeze and place the nation's total energy supplies in jeopardy. It should be apparent, therefore, why the coal industry will fight for its place in the energy market and will resist those things that would impair its capacity to serve the nation."

Yes, the Harris-O'Hara Bill will have to be modified to prevent sales of gas to industry below cost, if the coal industry's opposition is to be eliminated. There is opposition also from various consumer states that fear the price of gas will become too burdensome if producers collect the going market price. Despite the opposition to the Bill, the Administration favors the objectives of it, the gas producers are strong in Congress, and many pipeliners and distributors support it. It is expected that, after non-damaging modifications to pacify some opponents, the Harris-O'Hara amendment to the Natural Gas Act will become law.

Gas importation challenged

The coal industry continues its efforts to restrict the importation of natural gas from Canada and Mexico. Representative Saylor has a bill pending which would amend the Natural Gas Act to provide standards for determining the effect of proposed importation of natural gas on the public interest.

"Congress will ease the present rigid regulation of independent producers."

Legislation is being tried by the coal interests, because they have been losing their fights before FPC. Even though coal opposed it, natural gas in large volumes is now imported from Canada to the United States' West Coast. Since Canada has a surplus of natural gas, and the United States cannot meet customer requirements, no enactment is expected to discourage importation of gas.

Gas safety

Representative Heselton has introduced a bill to authorize FPC to prescribe safety requirements for natural gas pipelines. The highly publicized pipeline breaks and explosions have prompted this legislation. Such gas safety legislation is inevitable. One problem

will be to coordinate Federal safety regulations with the numerous state codes, which many interstate pipeline systems will encounter.

Relocation of facilities

Utilities will have more and more costly relocations of facilities to accommodate highways. The multi-billion dollar Federal-Aid highway program is gaining momentum and gas companies will be spending large sums on pipeline relocations. Today, the Federal law provides for partial reimbursement to utilities for relocation expenditures. Congressman Jones of Alabama has proposed an amendment to the Federal-Aid Road Act of 1956 to strike out the utilities' reimbursement provision. The next time major public roads legislation is before Congress it will be a battle to keep the utility repayment provision in the law.

The $33 billion highway program requires coordination of federal and state laws. The Federal-Aid law provides funds to reimburse states whenever utilities are paid for the cost of relocating facilities. Repayments to states are in the same proportion as are the Federal funds expended on the highway project constructed with both state and federal money. Funds from the United States Treasury shall not be apportioned to the states when the payment to the utility violates the law of the state or conflicts with a contract between the utility and the state.

There was an epidemic of 35 proposed state laws in 1957 to pave the road to paying utilities for part of the expense of rearranging facilities in connection with highway construction. There will be similar action in other states in the future. Nine states —Florida, Idaho, Minnesota, Montana, New Mexico, North Dakota, Oklahoma, Tennessee and Utah— passed legislation to pay for both publicly owned and privately owned utility relocations of facilities. Massachusetts passed the same kind of law in 1956. Colorado, Kansas, New York, Rhode Island, and Wyoming enacted similar laws, but they were vetoed by the governors. Georgia passed legislation applying only to publicly owned utilities. In 10 states the bills died in the legislative committees. Reimbursement of relocation costs was considered also by Delaware, Maine, Michigan, Missouri, Nebraska, New Hampshire, Ohio, Pennsylvania, Texas, and Wisconsin.

Utility managements and customers have an interest in these new laws, because a utility's cost of rendering service must be assessed against the ratepayers. Every utility user, therefore, will pay twice toward highways when relocation costs are not repaid to utilities. The customer pays once in taxes for highways and again in higher utility rates to cover relocation costs.

State legislation

Minnesota adopted a new law requiring a fair value rate base for utility ratemaking. It directs the regulatory body to consider current value of property devoted to public utility service. Abortive efforts were made in New York to change the existing statute, which requires the weighing of present costs, to an original cost rate base formula. At the same time, Maine passed a law defining reasonable value and excluded current value. The number of states classified as present fair value jurisdictions is 15. The pressures of higher prices for labor and materials make legislatures and utility commissions more responsive to current value of utility property upon which to base new rates.

Arkansas is heading the parade for fair field prices in making gas rates. The Arkansas supreme court reversed the state utility commission for using the fair field price method, because the statute did not permit it. Promptly after the court decision, the legislature changed the law to authorize the use of a fair field price.

TRENDS IN UTILITY REGULATION

THE most significant trend in the regulation of public utilities is the recognition of the ravages of inflation upon earnings. Utilities and especially gas companies are becoming poor with growth and must seek rate relief repeatedly. More and more people are accepting a long-term inflationary trend as highly probable. The high cost of new money is also significant in utility regulation.

Inflation and utility compensation

The current inflation is out of the ordinary. In the last 10 years the government's measure of how much it costs to live has gone up in eight of those years. To find a third year when the index declined you must look back to 1939. Before World War II the cost of living was about one-half of the level that it is today. Inflation has always accompanied wars, but this is the only time that prices continued to increase years after the nation had returned to peacetime activity. Huge government expenditures, easy credit and demands exceeding supplies of goods are the customary ingredients of inflation. Today, however, money is relatively tight and the supply of goods is adequate, yet prices climb higher and higher. Whatever the causes are, all of this points to a creeping inflation in the future. Utility owners have experienced a startling increase in the cost of money—to the highest point since the 1930's. The actual rise in prices for everything utilities need will surely give them serious problems, which will be experienced in turn by regulatory commissions.

The attrition in earnings is certain when a utility must pay many times as much for replacements and additions to plant as in past years. The revenue from rates for

"The importance of incentives to discover more gas to meet the amazing demand will get more attention."

service geared to old economic conditions will not be sufficient to cover the cost of the new property plus a fair profit. Such conditions compel applications to public utility commissions for higher rates. Some commissions have offset the erosion in earnings caused by inflationary prices for labor, materials and money by using estimates of a future year rate base, expenses and revenues. Other enlightened commissions, like West Virginia, Wyoming, Oregon and California did in recent decisions, have made separate allowances above the adopted fair return. Such allowances are intended to offset the known decline in earnings so that the utility will realize the return which is considered to be reasonable for at least a year in the future.

Inflation is causing a new series of rate cases in the United States, and especially in those states where customers' requirements are growing. Expansion will be more costly in the years to come, and the chain reaction means more utility requests for rate relief.

Foresight in regulation

The latest annual report to the National Association of Railroad and Utilities Commissioners by the committee on rates of public utilities has a contagious idea. The committee states that renewed inflation and the higher cost of capital make it necessary to adopt a forward looking view in fixing the prices charged by utilities. Regulatory methods have been looking backward. The reason is that commissions have required proof of actual experience rather than estimates of the future in most cases. The NARUC doctors say that the changed and damp economic climate prompts a prescription for the ailing utilities that will be preventive medicine to safeguard financial health.

The NARUC committee thinks that the renewed impact of inflation on operating costs, coupled with the higher cost of new capital, will exert a double pressure for elevation of utility rates. Lacking any offset, earnings sufficient now under present rates are destined to become inadequate tomorrow. This appears to be a continuing problem. The committee added:

"Inflation will cause higher prices for wages, materials and money with a resulting need for increases in prices charged by producers, interstate pipelines and local gas distributors."

"There are, however, a number of factors which hold forth some promise of at least mitigating this upward pressure on utility rate levels over the long pull. Success in this respect hinges on the manner in which utility operations are conducted. Fundamentally, it is a question as to whether a utility management functions with the long-term view in mind, or must tailor the pattern to accomplish short-term results.

"For example, if utility plant is constructed on a wholesale and stabilized basis, with the ultimate usage as the determining factor, utility service can be produced over the life of such plant at a cost lower than would be required if the plant were constructed on a piecemeal, start-stop basis.

"However, such a program, which has favorable long-range cost implications for the utility customer, involves the utility itself in higher initial capital commitment, together with its depressing effect on current earnings, and the assumption of a longer term risk.

"In the utility operating field there are similar possibilities. Expanded research and long-range employee training may well produce increased efficiencies in the future years, even though expenditure for such purpose today results only in reducing current earnings.

"With some margin in current earnings, utility management can safely adopt these programs which promise in the long run to provide some offset to the continuing upward pressure on utility rates. However, if a utility management considers that earnings are already at an inadequate level, they will be apt to adopt only the short-term programs which minimize or eliminate risk and the immediate impact on earnings.

"Recognition of this particular function performed by adequate earnings is somewhat new to the field of regulated utilities. In unregulated industry it has long been apparent that the management of those companies whose earnings have afforded them the opportunity to operate for the long pull are producing, on a quality-price balance, the goods that the consumer prefers. It may be that commission consideration of those factors should enter into utility rate fixing."

Larger returns allowed

A utility is entitled to gross revenues that will pay all operating expenses, depreciation, taxes, charges on debt, dividends on preferred stock and a rate of earnings on the total common stock equity that is equal to the amount realized by comparable enterprises. The Kentucky commission aptly defined a fair return in a recent rate case thus: "What constitutes a fair rate of return depends upon many circumstances and must be determined by the exercise of a fair and informed judgment having regard for all relevant facts. It must be sufficient to insure the investors confidence in the financial success of the business and maintain and support the utility's credit in order that it can raise the capital necessary to improve and expand its service in accordance with the public need."

John F. Childs, vice president of Irving Trust Co., states the importance of financial strength in the utility business. Whether the industry will do a good job for the consumers, employees and investors depends on its financial health, he says. Capital is vital to utilities. About $3.50 of invested capital is needed for each $1 of annual revenues. Approximately one-third of operating revenues are needed to service debt and

equity capital, plus depreciation. He adds that financial policies must be sound so that long-term securities will still permit the utility to endure unforeseeable difficulties. Capital must be permitted to earn a fair return. The savers who risk their money in utilities should be rewarded justly. Almost everyone today supplies money directly by investing in securities, or indirectly through life insurance policies, banks and pension funds.

A survey of the rates of return allowed to natural gas distribution companies shows an encouraging trend upward. In the nine gas rate cases during 1956, commissions allowed an average rate of return of 6.3 per cent on comparable rate bases. In the six cases granting price increases to gas distributors in 1957 the allowed average rate of return climbed to 6.7 per cent. The current national trend toward higher allowed returns is an essential recognition of the extraordinarily high cost of new capital for which gas companies must compete. The sun is shining brightly on this phase of ratemaking.

That four-tenths of 1 per cent rate of return rise in 1957 over 1956 could restore financial vitality to gas distributors. A small increase in the allowed rate of return means a large increase in net revenue. In ratemaking, the rate base is multiplied by the selected rate of return to produce the amount of net revenue available to service bonds, preferred stocks and common stock equity. For illustration, let us assume that the $20 billion invested in the gas business represents the total rate base. Then a four-tenths of 1 per cent increase in the authorized rate of return would bring in $80 million more net revenue during 1958.

Utility depreciation

The Indiana commission made history in adopting economic depreciation last year. It granted a rate increase to a utility based on present fair value, plus recognition of depreciation measured in current dollars. The commission stated that inflation has caused a decline in the value of the dollar approximating 50 per cent since 1945. It added that depreciation is as much a cost of doing business as wages. Depreciation, said the commission, is the cost of property consumed from day to day in rendering service. Depreciation measured in current dollars tends to reflect a realistic picture of profits in which there is no understatement of cost, concluded the commission.

"More regulatory commissions will consider current rather than original cost in determining rate bases upon which to allow higher returns to utilities."

The Iowa supreme court declared in favor of depreciation expense based on present value rather than original cost. The court said that it would do the utility no good to set rates on the present value rate base if it is ignored, and the value represented in the base eroded away by refusal of an adequate annual depreciation expense allowance. The court asserted: "We are content to accept the 2 per cent figure on all gas property and to apply it on the present valuation. In other words, we must continue to allow the same rate of depreciation on the present property value as was allowable upon the original investment. This will permit amortization on the fair present value over its remaining life."

This is a resurrected trend in depreciation for ratemaking, which had been dead since 1944. In that year the United States Supreme Court in the famous Hope Natural Gas decision denounced the basing of annual depreciation on present value. The court's view was that it is sufficient to repay the original cost of property in annual depreciation expense throughout the service life of the property. It stated, "By such a procedure the utility is made whole and the integrity of its investment maintained."

It is in times like the present that economic depreciation is advocated. If depreciation allowances, which customers pay, are based on present value then replacements costing twice as much as the original property can be financed with depreciation funds. Economic depreciation will be a lively subject in 1958.

Utility rate fixing when accelerated tax depreciation has been elected is a currently torrid subject. Eleven commissions have decided such cases. Six regulatory bodies have used normalized taxes and five have adopted the actual taxes paid for the test year. The debate is whether taking rapid depreciation for Federal income tax purposes is a deferral of taxes or a saving. The New Hampshire commission stated: "The Internal Revenue Code of 1954 permitted liberalized methods of computing depreciation for income tax purposes, which offered management the opportunity to make considerably increased annual depreciation accruals during the early years of plant life, and consequently great tax savings. It was originally assumed that these tax savings would be of a temporary nature, and that they would be exhausted in later years.

"It is now the considered opinion of utility accountants, and many regulatory commissions, that in the case of a growing and expanding utility, such tax savings will be continuous so long as the growth continues."

As a result of some commissions' passing all the benefits of accelerated tax depreciation on to the ratepayers, several utilities have declined to elect rapid depreciation for the future. Pennsylvania has considered that management has the discretion to elect accelerated tax depreciation or to choose the normal allowance for depreciation. If the utility takes the optional rapid depreciation, the commission fixes rates on the actual taxes paid and credits the savings to the consumers. When a utility elects to use normal depreciation, then its rates are fixed on an allowance of the normal taxes, which are actually paid. So far, no commission has tried to force a utility to choose

accelerated tax depreciation or take the consequences of rates that pass the tax advantage on to the ratepayers.

Depreciation will follow its current trend of being a controversial subject and Congress will probably hush the shouting by repealing the accelerated depreciation provision in the Federal income tax law.

Automatic adjustment

The amount paid by a retail natural gas distribution company for the gas it purchases from an interstate pipeline wholesaler is usually more than half of its total operating expenses. During this period of frequent major FPC increases in the price paid for such purchased gas, financial damage is experienced by the retail gas company when it is forced to absorb the large transitional loss before the state commission can grant offsetting rate increases. This unjust situation flows from the rule that a retail utility cannot get retroactive rates, and the procedure for an interstate wholesale gas supplier to place price changes into effect under the Natural Gas Act six months after filing them with FPC. Many retail gas companies have not obtained concurrent offsetting rate increases, so the provision for automatic rate adjustment has been developed.

Advocates of the automatic rate adjustment for changes in the price paid for wholesale gas give many reasons for the fairness and feasibility of the procedure. The procedure is simple, equitable and it protects the ratepayers and stockholders. It operates in the event of a decrease as well as an increase in the cost of purchased gas. Any refund ordered by FPC is passed on to retail ratepayers. The automatic plan reduces the number of rate cases, which saves regulatory expense for the utility and time for the commission. It stabilizes earnings near the level before the rate change. This automatic provision is comparable to fuel clauses which have been widely accepted in connection with electric rates.

The opponents of such automatic ratemaking contend that the result is a denial of due process of law to the retail ratepayer, because there is no public notice and a hearing each time the actual rate is increased. The answer is that there has been a notice and hearing before adoption of the automatic price adjustment procedure. A rate schedule that has been found to be just by a commission, which contains a charge that can be computed by a fixed formula is as definite a charge as one that is stated in terms of money. Escalator clauses have been approved for more than 30 years.

Opponents say that the automatic adjustment provision guarantees that the utility will earn a fair return at all times without any regulatory lag. The procedure really cannot guarantee a fair rate of return to a utility, because many other components affecting earnings will vary, such as wages, taxes, and dollars invested in facilities.

The most recent report of the American Gas Association rate committee shows that 81 natural gas companies in 31 states have cost-of-gas adjustment clauses in their rate schedules. Kentucky is the state that has most recently authorized gas distributing utilities to adjust retail consumer rates in accordance with increases or reductions in prices paid suppliers, without the expense or delay of formal rate cases before the commission. This is regulatory progress.

The need for cost of gas adjustment provisions in the rate schedules of retailing gas companies is imperative. It is predicted that this just procedure will gain advocates and many more authorizations from public utility commissions in coming years.

Local taxes

Numerous cities and counties have taxed utilities as an easy means of enlarging tax revenues. Individual taxpayers protest long and loudly. The taxing demons know there will be less rebellion in taxing utilities, which in turn collect from the uninformed ratepayer. The customary utility bill is for service rendered, and does not show any of the individual costs of performing the service.

Virginia recently had the courage to expose the local tax device. It ordered the utility to add local taxes to the charges for service. The commission, which was upheld by the Supreme Court of Appeals of Virginia, gave two reasons for its action. The taxes paid to the locality by the company are used for the benefit of the people who live there. If the utility did not pay these taxes, the city would have to levy other taxes on the local citizens. If a city can assess taxes that are paid mostly by people who do not live and vote there, self-interest will persuade it to rely more and more on such taxes for the support of the local government.

Utilities can follow the lead of Virginia and convince their state commissions to discourage local taxation without representation.

Utility financing

"Rolling economic adjustments" have characterized 1957. In this inflationary climate, monetary policies have been restrictive. Federal Reserve sought to limit credit expansion and the upward pressures on prices. The effect of these policies at the time of mounting demands for money was to catapult interest rates to the highest point in 25 years. The banks and the securities markets were pushed to provide funds. Bank loans expanded to record levels, and there was a high volume of new security offerings at rising yields. To compete success-

Continued on page 129

"TRENDS FOR '58" CONTINUES IN THE PIPELINE SECTION BEGINNING ON PAGE 93.

4TH IN A SERIES ON APPLIANCE CONTROLS

What a serviceman should know about . . .

SELF-POWERED HEATING CONTROLS

By ROBERT FARMER • General Controls Co., Glendale, Calif.

A CONTROL system is a group of individual components which affect each other. We must consider the total system, then all the separate parts. Proper operation of the complete control system always depends on the full contribution of each of the individual components.

Fig. 1 shows a basic automatic control system.

The *thermostat* is an automatic switch which turns ON or OFF the electrical current to the valve.

The *gas valve* turns on or off the flow of gas to the main burner of the equipment.

The *pilot generator* does three things:

1. Provides the "pilot" flame to light the main burner.
2. Actually generates the electricity to operate the gas valve.
3. Allows the gas valve to open only if the pilot is lighted and burning properly for safe ignition.

The *wiring* connects the components in series. Electricity is conducted from one component to another—generator to thermostat, thermostat to valve, and valve back to generator—right around in a circle—in a "series" circuit.

Components

Pilot generators—This is a combination pilot burner and electrical generator. They vary in appearance, (see *Fig. 2*) but all generate electrical power by the simple, time-proved thermocouple principle. The PG-1 can develop over 300 millivolts (300/1000ths or 0.3 v). The G250, which is a generator cartridge only, develops about 250 millivolts (250/1000ths or 0.25 v). The PG-9 produces over 700 millivolts (700/1000ths or 0.7 v).

A *"thermocouple"* consists of two dissimilar wires welded together at one end called the "hot junction." When this junction is heated and the other end of the wire remains relatively cool, an electrical potential (voltage) is developed. To increase the voltage, many single thermocouples are connected in series in an actual generator.

Fig. 3 illustrates the generation of electricity by thermocouples. The importance of proper flame and heat on generators is shown. The ideal condition is a blue, non-blowing flame which engulfs the thermocouple or cartridge. Too small a flame or a yellow lazy cold flame do not produce enough heat required to generate the strong electrical voltage. Without sufficient heat, electrical generation is lowered and efficient operation of the control system is also lowered.

Gas Valves—In over 20 years of manufacturing the B60 valves, many design changes have been made to improve operation, reduce cost and increase operating life. The same proved reliable basic principles have been retained even though exterior appearances have changed.

Operation of the valve is best explained by referring to the schematic diagrams in *Fig. 4*. The operator (upper portion of the valve) is essentially a 3-way valve having a pressure port, a vent port and a common port or area between them. The armature can move against the vent port or pressure port to seal off one or the other. The position of the armature is determined by the forces of the spring or the electromagnet.

In the closed position, the armature is held against the vent port by the spring force. The vent port is closed and the pressure port is open. Main line gas pressure enters the operator through the pressure port.

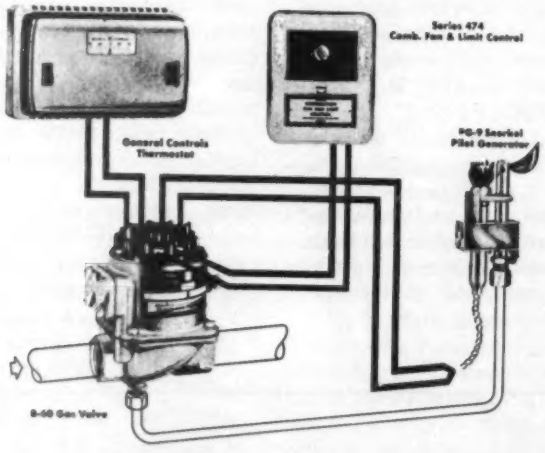


Fig. 1. Basic automatic control system.

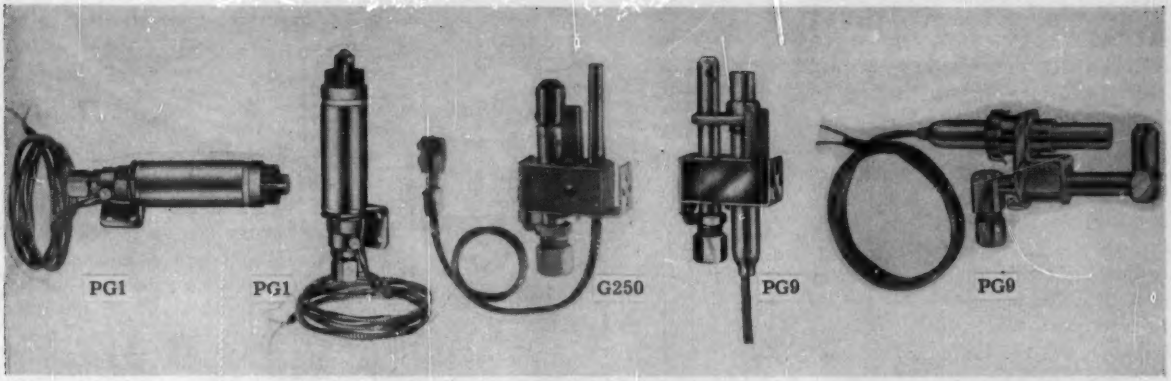


Fig. 2. Although pilot generators vary in appearance, they all generate electrical power by the simple, time-proved thermocouple principle.

The space above the diaphragm is filled with gas at the line pressure. Pressures above and below the diaphragm are equal, and the main spring (or, in the old style valves and all larger size valves, a weight) holds the diaphragm valve closed.

When electrical current flows through the coil, the electromagnet pulls the armature over to open the pressure port and close the vent port. A small amount of gas bleeds out the vent line as the main gas pressure forces the diaphragm upward. Now the diaphragm is off the main valve seat and gas passes through the valve to the burner.

When a thermostat, limit switch, wiring break or pilot outage stops the flow of electrical current to the electromagnet, the spring forces the armature back to its original position. The pressure port is open and vent port is closed. Main line gas pressure recovers above the diaphragm. As pressures above and below diaphragm equalize, the spring or weight closes the main valve to shut down the burner.

Thermostats and switches — These are generally pressure or temperature actuated devices used as "operating" controls to maintain operation at fixed conditions, or "limit" controls which prevent operation beyond a set point. Switches used in self-generating control systems must be of the type recommended for millivoltage. Run of the mill 24 v or line voltage contacts often have more electrical resistance than the self generating system can tolerate.

All temperature switches react to changes in temperature of air immediately surrounding the switch. Also temperature switches are affected by rate of temperature change. The faster the temperature change, the greater the room temperature variation. Real room comfort demands attention to:

1. Location of thermostat.
2. Selection of proper close differential or heat anticipated thermostat.
3. Balancing of heat distribution and fan or pump switch settings.

Within the last few years the applications of self generating systems have broadened due to development of automatic controls capable of mixing millivolt and 24-v circuits. These new systems have the advantages of millivolt systems plus the advantage of 24 volt systems. For example, in these "mixed" systems it is possible to operate on manual override during

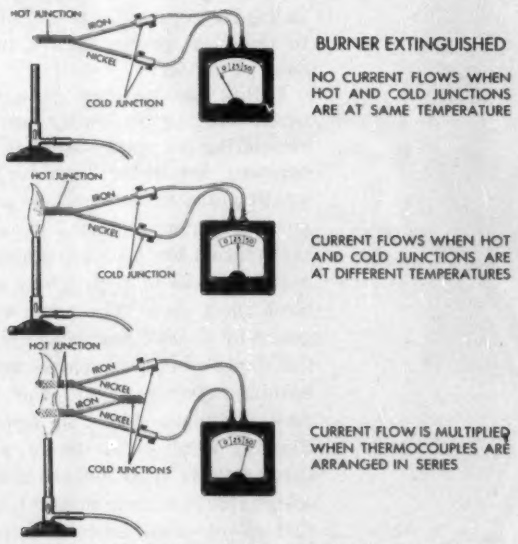


Fig. 3. Generation of electricity by thermocouples.

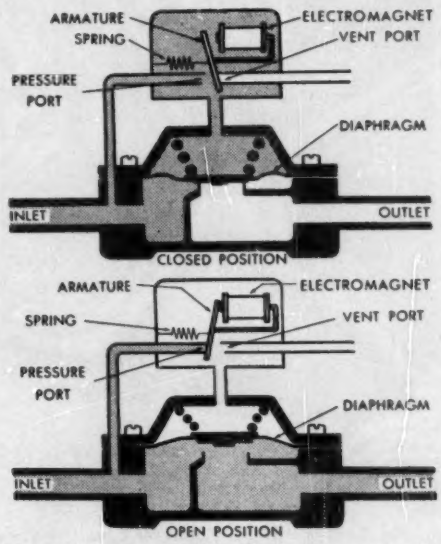


Fig. 4. Operating principle of diaphragm gas valves.

periods of power failure WITHOUT NEGATING THE HIGH TEMPERATURE OR HIGH PRESSURE LIMIT CONTROLS.

Three areas in which mixed systems are found are (1) year around air conditioning, (2) wet heat or hydronic heating and (3) certain heating equipment which by its unique design and installation is capable of operating as a gravity system. A quick review of a typical system in each of these areas will serve to illustrate the "mixed" systems.

Fig. 5 represents a typical summer-winter air conditioning master control panel operated from a single thermostat. In this case, the thermostat control circuit is completely 24 v. Heat anticipator is conveniently adjusted for the load of the heating relay. This is no ordinary relay. It has special very low resistance, noble metal, self cleaning contacts for handling millivoltage circuits. The "thermostat" connections on the heating equipment are connected to the lower "E" and "B" contacts of the heating relay in the master control panel. Thus, the heating relay has in effect replaced the millivolt type thermostat.

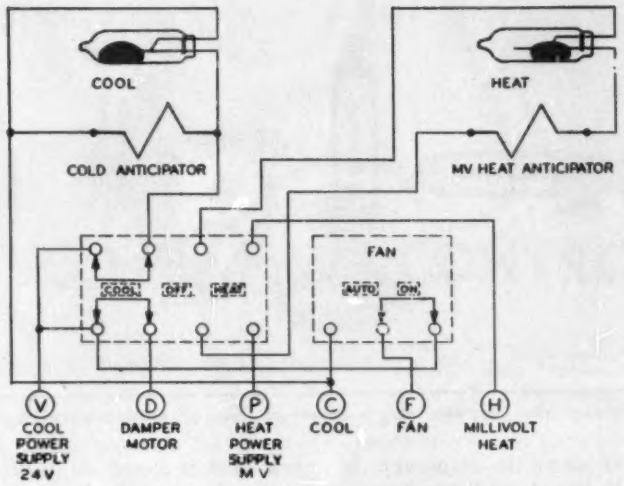


Fig. 6. Single thermostat controls millivoltage circuit and 24-v circuit.

Fig. 5. Typical summer-winter air conditioning master control panel operating from a single thermostat.

Another method is often used to accomplish the joining of a 24 v cooling control system with a millivolt self generating heating control system. The millivoltage circuit is completely independent of the 24 circuit, although both are controlled by the same thermostat. *Fig. 6* shows such a thermostat. This type of installation is often used where a millivolt controlled heating system was originally installed in a residence and later a remote cooling system is added. If by chance, the heating system was gravity type, its heating operation is not subject to electrical power failure in the dead of winter.

Utility service men in areas where heating equipment provides circulating hot water together with domestic hot water know well the wrath of the customer whose power goes off in a snow storm. Typically, the solution has been to manipulate control valves in such a way as to block them open. The home owner generally doesn't realize the potential danger involved when manual-opening devices negate the high limit switches. "Manual Opening Electric Trip" — a device which automatically trips out the manual opening device upon resumption of current—does not answer the problem. In fact the MOET gives a

false sense of security. These devices prevent the gas valve from closing in response to safety limit switches.

The R650 Transformer Relay, *Fig. 7*, is used on boilers and certain other equipment where gravity circulation with complete limit switch protection is desired during periods of electrical power failure. The R-650 is used with a B-60 millivolt gas valve, pilot generator and suitable limit switches controlling gas to the burner. Room temperature is controlled with a 24-v thermostat heat anticipated for 0.45 amp.

On a drop in room temperature the 24-v thermostat makes contact closing the DPST relay. One set of relay contacts close the line voltage circuit to circulator pump motor. The second set of contacts close the B-60 millivolt circuit if all limit switches are calling for heat.

In event of line voltage power failure, the system may be operated as a gravity system with complete safety. Turning knob from "automatic" to "manual" position closes the circuit to the B-60 gas valve. The burner operates at the demand of the operating and limit switches as long as the pilot generator is lighted and a safe condition exists. When power is restored, the transformer relay knob automatically trips back to automatic position. There is no possible danger of over limit condition since the gas valve is never opened manually and the various safety limits are never negated or bypassed.

There is no substitute for knowledge. Every service man has need of a good grounding in basic principles of what makes a self generating system operate. The fundamentals are simple and every job, no matter how complicated it appears, is merely an application of the basic principles.

Very few applications in the field are alike. Each is tailored to the specific furnace, boiler or other application. Thus, it is very undesirable to attempt to learn a few pat rules. Most likely the man who can reason may not be the first off of the service job but he will not have to return. So reason and understanding are the service man's best tools—closely following, is the millivolt meter.

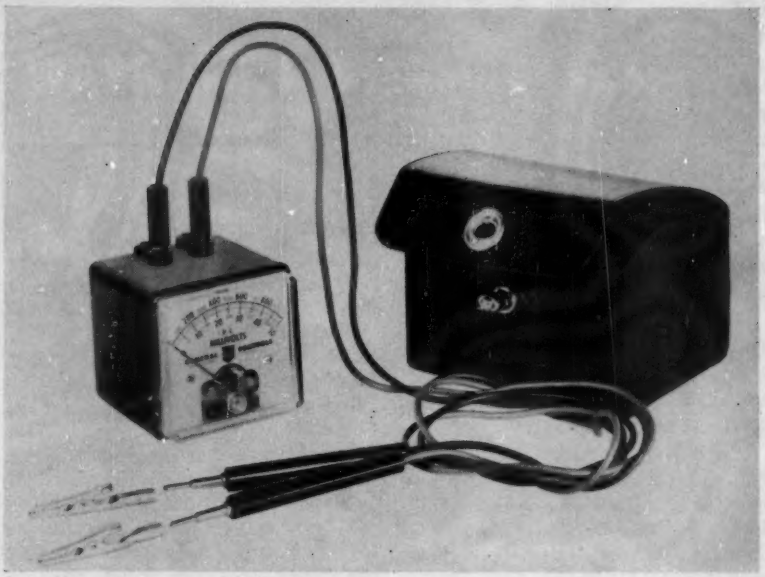


Fig. 8. Millivolt meter.

The millivolt meter (*Fig. 8*) is a simple device for measuring voltage or electrical pressure between two points in a millivolt control system. The millivolt meter costs $18.00—little more than a good pipe wrench—and will save its cost several times over in the first season of use. The millivolt meter eliminates guesswork—you know the installation is right when you leave the job.

It is possible to have a damaged valve, but the possibility is remote, especially if the system has been operating satisfactorily. A poor flame on the pilot generator, poor wiring connections and splices or poor contacts in limit switches or thermostat can cause a valve to open sluggishly. When lightly tapping the valve causes it to open, look for low pilot generator flame, or loss of voltage in wiring.

If a vent tube is clogged due to the tip being in the flame, there is no way to vent the gas from above the diaphragm. If valve won't open, disconnect vent line and blow out.

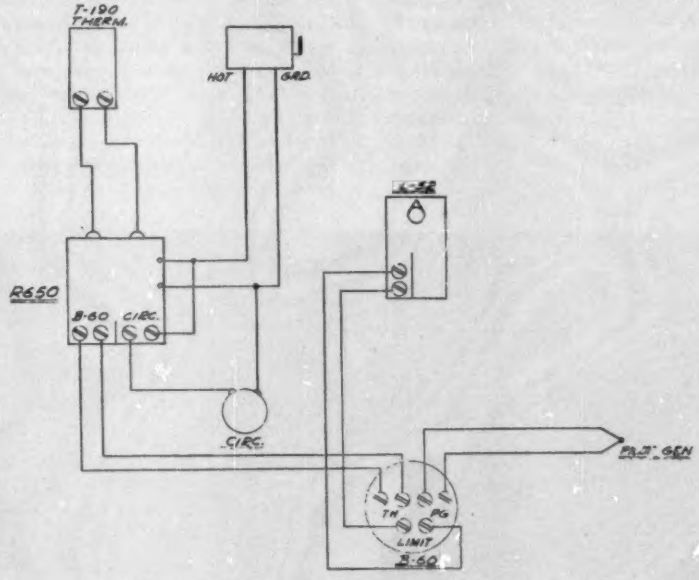


Fig. 7. Transformer relay.

Reposition it so tip is no longer in flame.

If a valve seems to stay wide open, carefully remove one of the pilot generator wires from the valve. It should close. If it does not, replace the valve or the operator. On the other hand, if the valve closes when wire is removed, then look for a short circuit in the thermostat wiring. A wire mashed by a nail or staple is a likely possibility.

The things which can cause a valve to act up are generally not in the valve. Check each component of the system. Get each component up to full contribution.

Pilot generator service is simple. If the hot junctions of the thermocouples or cartridge are not heated by a well defined blue flame, the complete control system may seem to turn on sluggishly. Room temperature may vary noticeably. The valve may seem to stick closed unless jarred. These are symptoms of low electrical generation due to insufficient heat on the thermocouple or loss of voltage through poor wiring.

Primary air holes of pilot burner are easily cleaned with a fine wire. The snorkel type burner completely eliminates clogged primary air by incinerating dust. The pilot burner orifice can generally be cleaned by disconnecting the tubing and blowing it out.

Thermostat difficulty can generally be located by jumpering or disconnecting wiring terminals at the valve and then at the thermostat back plate. Most thermostat complaints arise from location. The TV set or a reading lamp directly under the thermostat is guaranteed to make the room chilly. Dirty contacts can cause a sluggish turn-on condition. Smashed insulation of thermostat wiring causes a short circuit which keeps the valve open. All of these reasons for poor operation are caused by external causes. The obvious cause may be overlooked if one is in the habit of just changing out thermostats. It is far better to think of reasons for improper operation and then correct all of them than to make a snap judgment and only do half a job. ■

"Next month, Author Farmer will discuss 24-volt heating control systems."

GAS news

Ark-La continues diversification

Arkansas Louisiana Gas Co., an already strongly diversified operation, plans to enter yet another field.

W. R. Stephens, chairman of the Little Rock company, reports that a $3 million petrochemical plant is slated for Magnolia, Ark. According to the plan, the plant would extract 78,000 gals. of ethane from natural gas daily for marketing to the plastics industry. The plant, located near two gas pipelines, will also produce 66,000 gal. of propane, 14,000 gal. of iso-butane, and 13,000 gal. of butane.

American Natural's stock setup under study by SEC

Hearings are being held by the SEC to find out whether stockholders in American Natural Gas Co. hold "unfair" voting power in the company and whether its corporate structure is "unduly" complicated.

According to an SEC official, the agency believes that the preferred holders, with a smaller investment, may hold a veto power over American Natural's charter amendments, since the changes must be approved separately by different classes of securities holders. Last June 30, American Natural's corporate structure consisted of 4,863,246 common shares, or 62 per cent; $32,978,914 of earned surplus, or 15.5 per cent; $10.5 million of promissory notes, or 5.4 per cent; and 27,481 shares of non-redeemable cumulative preferred stock, or 0.3 per cent.

The SEC officials also said the commission questioned the complications involved in the non-redeemable feature of the preferred stock. The commission order stated that the position of the preferred shares in American Natural's corporate structure may violate federal laws for holding companies.

"Engineering Data Book" offers seventh edition

The seventh edition of the "Engineering Data Book," published by the Natural Gasoline Supply Men's Association, is being released for distribution.

Featuring a new section containing the revised NGAA Equilibrium Ratio (K Value) charts, the new edition is a complete manual for the design and oper-

The name of Samuel Klein, founder of Caloric Appliance Corp., was perpetuated recently at dedication ceremonies of the new Brandywine heights Joint High School in Topton, Pa. The auditorium and industrial wing of the new school were named in his honor and a plaque noting this fact was placed in the school's main lobby. Caloric, whose plant is in Topton, donated the 31 acres upon which the school was built. Inspecting the industrial shop are (from left): Ralph S. Merkel, school principal; Gus Klein, retired director of Caloric; Mrs. Gus Klein, Mrs. Nathan Klein; Nathan Klein, chairman of the Caloric board; and Julius Klein, the company's president.

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ation of natural gas processing plants.

Other new or expanded sections in the seventh edition include up-to-date information on: gas measurement; water treating; cooling towers; storage; gas, gasoline, and LPG treating; piping; fluid flow; compressors; and electrical equipment.

The 320-page book is available from NGSMA, 421 Kennedy Bldg., Tulsa 3, for $5 per copy.

Sponsored research hits new high at gas institute

A total of $661,000 was spent on sponsored research at the Institute of Gas Technology during the 1956-57 fiscal year. According to Dr. Martin A. Elliott, IGT director, this money represents an increase of almost 20 per cent over the preceding year.

Dr. Elliott reviewed general operations of the institute at the annual meeting of members and the board of trustees. At the meeting, E. J. Boothby, president of Washington (D. C.) Gas Light Co., was reelected chairman of the trustees. Eight trustees were renamed to the board and three new members were elected.

Eskill I. Bjork, chairman of the board of Peoples Gas Light & Coke Co., was elected to a three-year term. Elected to fill vacancies which will expire in 1959 are Gerald T. Mullins, president of Minneapolis Gas Co., and R. A. Puryear, Jr., president of Alabama Gas Co.

IGT's activities were highlighted by the launching of a four-year undergraduate scholarship program, an increase in the volume of basic research, and the largest volume of sponsored research in the institute's history, Dr. Elliott reported.

While most of the sponsored work was applied research, the gas industry also sponsored several basic research projects.

"The number of such projects increased in the past year," Dr. Elliott pointed out, "and it is hoped that this trend will continue."

"Basic research is the unsung hero of technologic progress," he continued. "The simple objective of basic research—the creation of new knowledge—has given us today's advanced technology, and must continue to be fostered in plans for our future progress."

The sponsored basic research, along with the sponsored applied research in the fields of gas transmission, distribution, production and processing, and fuel utilization, represents a broad attack on the gas industry's problems, both current and long range.

The gas institute increased its staff from 63 to 73 full-time persons to handle the greater volume of sponsored research.

Areas of basic research include physical properties of gas, new techniques for gas analysis, gas-making reactions, combustion, and applications of nuclear science. Sponsored research included projects on gas transmission, gas distribution, production of high-Btu gas from coal and oil, peak-load gas processes, catalyst research, petro-chemicals, utilization research, and energy studies.

Webster Engineering Co. is operating out of its new $500,000 plant in Tulsa. The three-part building consists of a 35x48-ft lab housing a variety of boilers for testing operations; the office building, housing administrative, drafting and reproduction departments; and the main plant, which houses sheet metal, welding, machining, assembly, testing, shipping, receiving and warehouse departments.

Gas blamed for less than 3% of building fires

Gas and gas appliances caused less than 3 per cent of U. S. building fires during 1956, according to AGA reports. The association arrived at the figure after reviewing annual estimates of the National Fire Protection Association. The nation's building fires mounted to a total of 824,400, with gas as the listed cause of only 21,000.

Losses in fires were estimated at $1,016,000,000 by the NFPA. Gas fires were charged with about 2 per cent of total losses—an estimated $24.5 million.

Defective or overheated heating and cooking equipment of all types caused an estimated 108,500 building fires with losses of more than $92 million. Gas-fired equipment was charged with 9800 of these fires at a cost of $12.8 million. Building fires due to gas and gas appliances, including gas explosions, were estimated at 11,200 with losses of $11.7 million.

The AGA points out that lightning alone was reported as having caused more than twice as many building fires as gas. In the NFPA list of 24 causes of building fires in 1956, "smoking and matches" led the list with 127,000. Greatest losses from known causes was $120.5 million attributed to "electrical, fixed services, fires due to misuse, or faulty wiring, equipment."

Union loans Trans-Canada gas for winter service

Natural gas will be available this winter to all municipalities —including the city of Montreal —on the Toronto-Montreal section of Trans-Canada Pipe Lines' transmission system.

According to Trans-Canada's Charles Coates and Union Gas' David Rogers, arrangements have been completed for a supply of gas to be borrowed from Union Gas Co. for the Eastern Canada section of Trans-Canada's market until Alberta gas arrives.

"We will return the full amount of gas borrowed by Union beginning next fall when Alberta gas will arrive here," explained President Coates. He said that the contract conditions under which the gas is loaned to Trans-Canada ensures that gas will be available

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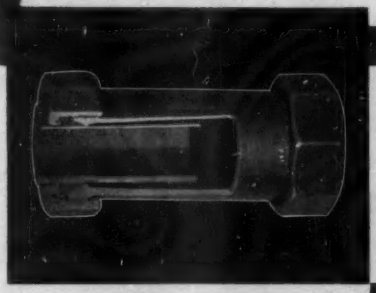

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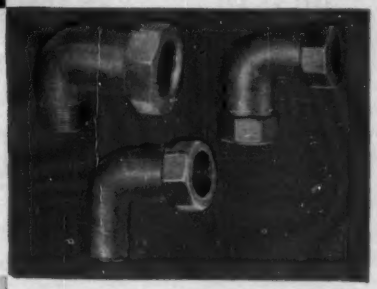

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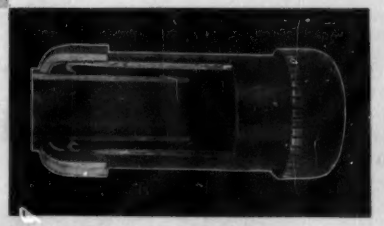

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to all the economically serviceable Ontario markets between Toronto and Montreal as well as providing for the conversion of the Montreal market from manufactured to natural gas this winter and next spring.

SEC approves Lake Shore merge

Upon receipt of SEC approval, Lake Shore Gas Co. and Lake Shore Pipe Line Co. joined the Consolidated Natural Gas Co. system.

Lake Shore Gas, serving 15,000 customers in the northeastern Ohio area from Painesville to the Pennsylvania line, joins East Ohio Gas Co., Cleveland, to become part of the largest natural gas distributing company in the state. East Ohio is part of the Consolidated system.

With the addition of Lake Shore's customers in Ashtabula, Geneva, Conneaut, Jefferson and six smaller communities, East Ohio now serves 750,000 meters in about 150 northeastern Ohio municipalities. Its service area reaches from the western suburb of Cleveland to the Pennsylvania line and south from Lake Erie to Youngstown, Uhrichsville, Dennison and Wooster.

Lake Shore Pipe Line becomes the sixth company in the Consolidated system. As such, it will retain its name and identity as a separate organization.

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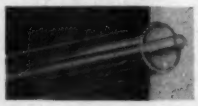

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Major heating promotion launched by Honeywell

Minneapolis - Honeywell Regulator Co. is in the midst of an unusual and all-inclusive sales promotion. The program was launched in November and will reach a peak in March.

Utilities, original equipment manufacturers, wholesalers, manufacturers' representatives have all been invited to support the Warm-Hearted House project, a nationwide modernization effort. Honeywell has invited 55,000 heating dealers and contractors to participate.

The promotion centers around a check-up of homeheating systems by participating dealers.

Here is how the program works: It will be announced to homemakers in March through an ad in *The American Home*. The ad will contain a quiz by which homeowners can rate their heating systems as to whether they are "lovable, livable or a liability." Then, the homeowners send the result of their quiz to a participating dealer. He, in turn, will give the homeowner a "$15 check-up" without cost.

K. L. Wilson, Honeywell vice president in charge of the residential division, says "The program is aimed at benefitting everyone in the heating industry by awakening homeowners to the shortcomings of their present heating equipment and inspiring them to want to improve it."

Utility Appliance adopts single brand-name identity

Effective the first of the year, Utility Appliance Corp. will market all its products under the single name of Gaffers & Sattler.

Utility has executive offices in Beverly Hills, Calif. and production facilities in Los Angeles. It

Gaffers & Sattler sales manager P. L. Chabre displays cartoon characters, Mr. Gaffers and Mr. Sattler.

produces gas ranges, water heaters, and heating, air conditioning and ventilating equipment. The move also will affect its gas and electric water heater subsidiary, Mission Appliance Corp.

According to President Ben B. Breslow, products previously made by the parent company and its subsidiaries and divisions will have the Gaffers & Sattler brand added without sacrificing their individual names.

The success of the Gaffers & Sattler name in its major established market, southern California, and areas such as Texas, where it was more recently introduced, was given by the Utility spokesman as a major reason for the "single brand name" decision.

"The success," said Mr. Breslow, "has been due in large part to the Mr. Gaffers and Mr. Sattler cartoon characters . . . They gained immediate public acceptance and helped increase our range sales as high as 50 per cent each year in southern California."

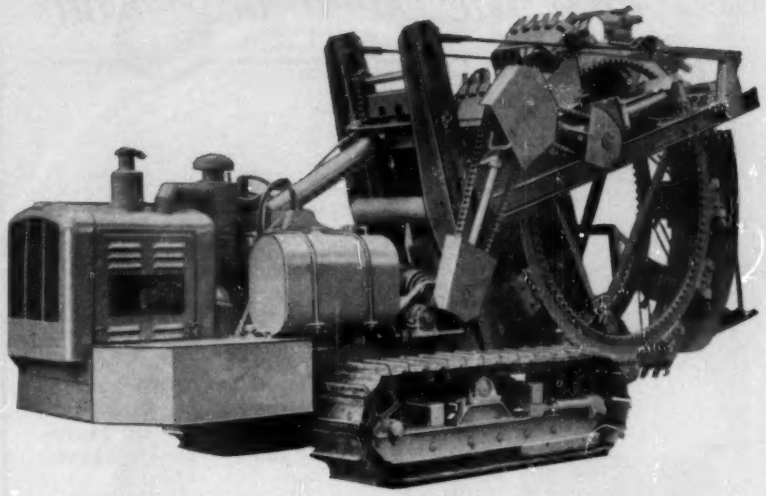
The move is timed with extension of Utility products to a total of 27 major domestic marketing areas covering the Pacific coast, Mountain states, the South, and the Midwest as far as St. Louis.

GAMA honors Eiseman, gas chemistry specialist

John H. Eiseman, gas chemistry specialist of the National Bureau of Standards since 1921, was honored recently by the Gas Appliance Manufacturers Association.

GAMA presented Mr. Eiseman with its distinguished service award for his "great contribu-

trench widths: 20 TO 32 INCHES



with NEW 170 wide-wheel Trenchliner

- **wide wheel frame — cutting widths from 20 to 32"**
- **maximum digging depth 5'9"**
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- **30 digging speeds from 12" to 25 lineal feet per minute**
- **heavy-duty cast-steel buckets**
- **double-point "Tap-In" teeth — self-sharpening, reversible**
- **quick-change gumbo buckets**
- **retractable bucket-cleaner**
- **hydraulic wheel-hoist on power-tilt mast**
- **standard tractor crawlers — 16" grouser-type treads, or 12" flat shoes optional**
- **choice of gas or diesel power**
- **all main gears enclosed in oil bath; all main shafts on antifriction bearings**

Now, another wheel-type Trenchliner joins the big Parsons line — a new 170, with extra-wide wheel frame. Developed to meet the demand for wide work range in a medium-size machine, it digs up to *32 inches wide,* at depths to 5¾ feet. With all this extra capacity, you get smooth, positive wheel control.

Hydraulic power raises and lowers the wheel on vertical mast with fractional-inch accuracy — and tilts the mast for traveling or trailer-loading. New hydraulic control system on conveyor gives belt speeds up to 600 feet per minute — *completely independent of digging wheel speeds.* Belt easily handles maximum yardages from the extra-wide wheel — puts spoil bank well back beyond edge of trench. Better have Parsons distributor demonstrate what this new 170 will do for you!

Other sizes range from a smaller wheel model to "big-inchers" and "middle-inchers" — also, ladder-types on crawlers, and on rubber.

mail to: PARSONS Company, NEWTON, IOWA

Send us more information on new 170 wide-wheel Trenchliner

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P798 G

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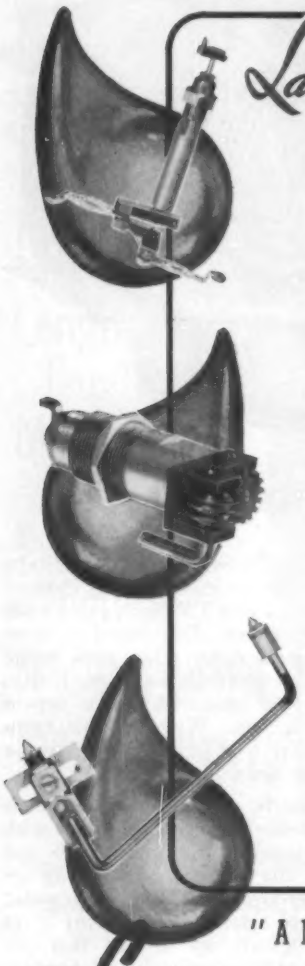
A DIVISION OF KOEHRING COMPANY

accuracy preserved in oil



Lancaster

MAIN MOVEMENT, INDEX DRIVE AND CARRIER WIRE ASSEMBLIES FOR 1-A SPRAGUE METERS

All moving parts in the Lancaster Main Movement, Index Drive and Carrier Wire assemblies operate in oil bearing metals. The oil-bearing surface of the Main Movement is greater than competitive assemblies by 30% in the Upper Main Movement, and by 126% in the diaphragm linkage.

- Once installed and adjusted, Lancaster parts need not be disturbed for oiling or greasing.
- The accurate performance of Lancaster parts is never restricted by excess oil or grease becoming stiff or sticky in cold weather.

Lancaster parts are made of hard metals—steel, bronze and brass; last life of meter. They're easy to install and adjust to unexcelled accuracy. For accuracy that lasts . . . order Lancaster Main Movements, and Index Drive assemblies and Diaphragms with built-in adjustable Carrier Wire Assemblies for your 1-A Sprague Gas Meters.

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tions to the progress of the nation's gas industry."

In making the presentation, E. J. Funk Jr., chairman of GAMA's industrial equipment division, said Mr. Eiseman's early research and testing of gas burners resulted in publication by NBS of the first authoritative technical papers on the designing of atmospheric burners to insure maximum safety and complete combustion.

GAS news notes

L. B. Foster Co. has moved its Los Angeles office to larger quarters at 3540 Wilshire Blvd. The move was made to accommodate the sales staff, which has doubled since the office was opened in 1953.

Over 3700 prospective customers in Brigham City and Logan, Utah, have signed contracts with Mountain Fuel Supply Co. for gas service. In mid-1957 MFS asked the Utah PSC for permission to build a $3.2 million 12-in. line north from Ogden to serve these communities.

Dearborn Chemical Co. is now national distributor for F.O.S. Safe-T-Clad tape, manufactured by Seamless Rubber Co. Dearborn will maintain warehoused stocks in Los Angeles, Chicago (company headquarters), and Linden, N. J.

Houston and New York representatives have been named by Gas Machinery Co., Cleveland, for its line of chemical process equipment. Oil & Gas Agencies Ltd. is the Houston representative covering the east Texas area. In New York, the distributor is Dynatrol Inc.

William E. Brice Co., Houston, is now representing the Pacific division of Bendix Aviation Corp., North Hollywood, Calif. From its Houston headquarters, Brice will handle Electro-Span digital supervisory control systems in Texas, Arkansas, and Louisiana.

Maxter Metals Corp. (Max Stern, consulting engineer), New York, has been reappointed general representative of Leo Gottwald Kommanditgesellschaft, Werk Hattingen/Ruhr, Germany. Maxter has represented the German manufacturer of forged steel flanges and welded fittings for the past six years.

GAS calendar

January

6- 8. .AGA Home Service Workshop—Hotel Radisson, Minneapolis.

10. .SGA Employee Relations Round-Table Conference — Edgewater Gulf Hotel,; Edgewater Park, Miss.

17. .SGA Accident Prevention Round-Table Conference — Noel Hotel, Nashville.

17. .Oklahoma Utilities Association Accounting Section Meeting—Tulsa.

23. .NEGA Operating Division—Hotel Statler, Boston.

24. .SGA Pipeline Chief Engineers Round-Table Conference—Hilton Hotel, El Paso.

30. .New England Gas Association Accounting Division—Hotel Statler, Boston.

February

6- 7. .SGA Accounting Management Round-Table Conference—Monteleone Hotel, New Orleans.

6- 7. .SGA Sales Executives Round-Table Conference — Monteleone Hotel, New Orleans.

12-14. .Ninth Annual Tulsa Corrosion Short Course for Pipeliners (Tulsa Section, NACE)—Mayo Hotel, Tulsa.

20-21. .SGA Distribution Management Conference — Roosevelt Hotel, New Orleans.

20-21. .SGA Transmission Management Conference (Spring)—Roosevelt Hotel, New Orleans.

20-21. .SGA Distribution Management Roundtable Conference—Roosevelt Hotel New Orleans.

March

17-21. .National Association of Corrosion Engineers—San Francisco.

20-21. .New England Gas Association Annual Meeting—Hotel Statler, Boston.

24-26. .Mid-West Gas Association — Broadmoor Hotel, Colorado Springs.

27-28. .Oklahoma Utilities Association Annual Convention — Biltmore Hotel, Oklahoma City.

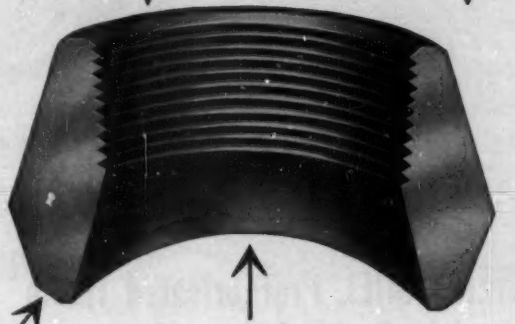
31-April 2. .GAMA Annual Meeting—The Greenbrier, White Sulphur Springs, W. Va.

31-April 2. .AGA General Management Section Conference — Washington, D. C.

HOUSE CONNECTIONS
on NEW steel distribution mains

NEW GAS COMMUNITIES

STEEL REPLACEMENT OF CAST IRON MAINS



SHAPED TO FIT
BEVELED FOR WELDING
SPECIFY AND USE

RUGGED
FOR PERMANENCE AGAINST EXTERNAL FORCES AND CORROSION

FAST
INSTALLATION IN THE STREETS WHERE MINUTES COUNT

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BONNEY

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In the drawing above notice how by integrating the roof line of the house and garage, a long, low, modern look is obtained. This is just one example of how a standard STURDYBILT three bedroom home can be styled to suit individual needs. Write for information.

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GAS people

A. W. Conover
Equitable

Donald Beecher
Equitable

A. W. CONOVER has been elected chairman of Equitable Gas Co., Pittsburgh, and DONALD B. BEECHER was named his successor as president. The company said Mr. Conover's relief from the duties of president was occasioned by his continued serious illness. Mr. Beecher has been vice president and general manager of Equitable since 1952. He joined the company in 1926 as an engineer and in 1942 became assistant to the vice president in charge of operations at Kentucky, West Virginia Gas Co., an Equitable subsidiary. Directors also elected JOHN T. BROWN executive vice president, a newly created post to include duties formerly performed by the general manager. FRED N. WOLF and C. J. MULLHOLLAND were named senior vice presidents and directors.

GEORGE W. RYERSON has taken over the newly created post of director of public relations for Northern Illinois Gas Co., Bellwood, Ill. Mr. Ryerson will continue to serve as secretary of the company.

JOHN C. DEZELLE has transferred to Houston and assumed his new duties as assistant operating manager of United Gas Corp.'s Texas distribution operations. Mr. Dezelle has been with United Gas for

George Ryerson
Northern Illinois

John Dezelle
United Gas

26 years. Most recently he was assistant division manager at Beaumont, Texas.

ALVAN V. BRASHEAR is now manager of operations of Michigan Consolidated Gas Co., Detroit. He succeeds the late Roland R. Paulin. Mr. Brashear joined Michigan Consolidated as a cadet engineer in 1923. The 34-year veteran has experienced all phases of gas distribution operations, including service shop, street, meter and pressure departments. He has been assistant manager of operations since 1953.

C. WADE MCCOY has been appointed permanent vice president and general manager of Lakeland Natural Gas Ltd. and has established his headquarters at the company's general offices in Kingston, Ont. Mr. McCoy formerly was vice president and general manager of

A. V. Brashear
Mich Con

Wade McCoy
Lakeland Natural

the Kansas Public Service Co. and had served as a division manager with Kansas Power & Light Co.

JOHN W. HENDRICKSON is now manager of the geological, land and lease and right-of-way departments of New York State Natural Gas Corp., Pittsburgh. He joined New York State in 1953 after 12 years with Peoples Natural Gas Co., an affiliate.

MILTON C. BALDRIDGE was elected secretary of the Columbia Gas System Inc. at a recent board meeting. He has been secretary of the Columbia Gas System Service Corp. since 1945 and has also served as secretary or assistant secretary of various other system companies.

LOIS JACOBSON has been appointed home service advisor in Springfield, Ohio, for Ohio Fuel Gas Co.

(*Continued on page* 84)

dig 'em and fill 'em with Clevelands

This gas company crew is putting a new Cleveland 110 through its paces. Like so many others who know Cleveland's fitness for utility distribution work, this Indiana company has standardized on Clevelands for more than 20 years.

Mains of the same Indiana company are backfilled—and simultaneously compacted—by the one-man-operated Cleveland 80W. It lays pipe, pulls crossings and does other side crane work, too.

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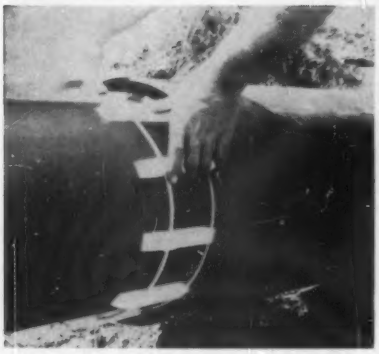
Gas Digest

A digest of what's new in products and trade literature compiled by the editors of GAS as a reader service.

New Products and Trade Literature

For more data on any of these items use the Readers' Service Card on pages 81, 82



1. Casing cradle

A new casing cradle insulates the pipeline from the ends of the casing. The WmSON three-way cradle is positioned in casing ends after drag section is in place and tie-in welds are made. The flexible, non-conductive cradle, which encircles the pipe, prevents the drag section from touching the casing ends should it ride the side or top of the casing. In addition, the three-way casing cradles also provide for easy installation of casing bushings.
T. D. Williamson Inc.

2. Floor furnaces

Tamco's new line of Barnes gas-fired floor furnaces reportedly is the largest output furnace of its type requiring no wall cutting. Mounted flush to wall, the single-register furnace combines streamlined compactness with heavy duty performance. Also available in a smaller model, the Tamco half dual furnace needs no pit or large floor opening.
Tamco Corp.

3. Conversion facts

A reference table for engineers has been published in wall-chart form by Precision Equipment. Included in the chart are such conversions as inches to centimeters or watts to hp. Others include atmospheres to Kgs/sq cm, cm/sec. to miles/hr, cu ft to liters, microns to meters, quintal to lb.
Precision Equipment Co.

4. Survey monument

A new survey monument with an adjustable top eliminates the need of digging and raising monuments to new road levels. According to Charles Bruning Co., the adjustable top permits the monument to be brought easily and quickly to the new level without loss of accuracy of survey points.
Charles Bruning Co.

5. Electronic information

Bristol's new electronic transmission system is based on the use of a differential transformer transmitter and an electronic Dynamaster receiver. The system measures a wide range of variables and converts them to a-c voltage signals which are proportional to the measurements. The a-c signals are transmitted continuously and instantaneously to remote self-balancing electronic Dynamaster receivers.
Bristol Co.

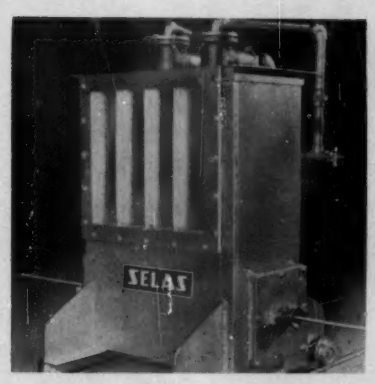
6. Crane-excavator

Time-saving accessibility, low-cost maintenance and versatile service are featured in Bucyrus-Erie's new transit machine, the 11-B. The 11-B is readily convertible from a 10-ton lifting crane to a dragline, clamshell, hoe, or shovel to handle a variety of jobs. It is mounted on a 6-wheel drive carrier, which provides up to 47-mph speeds.
Bucyrus-Erie Co.

7. Radio servicing

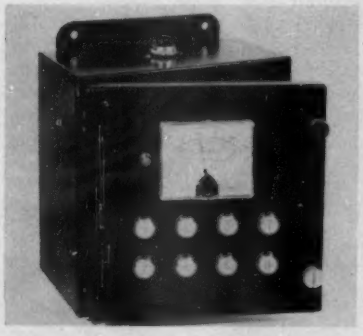
Simplicity of use is featured in a new, multi-purpose portable test set from Motorola. It is designed to facilitate the aligning and testing of all Motorola mobile and base stations. Also featured in the set are function-grouped controls and calibrated meter scales. A transistor-

ized electronic a-c voltmeter and a full view, 4-in., 2 per cent meter are included.
Motorola Inc.



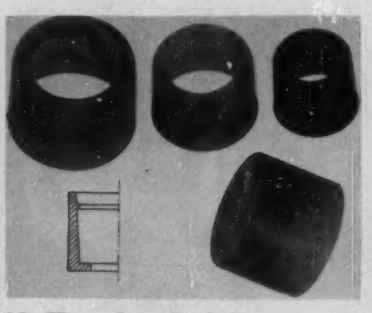
8. Heat-treat furnace

High temperature materials in wire and rod form are heated for heat-treating and hot working—continuously at high linear speeds—in a new Selas furnace. In installations in wire-producing plants, these furnaces are continuously heating tungsten and molybdenum rod for swaging. For this use, the furnace heats rods at any rate required by the swager. Burner design produces chamber temperatures as high as 3200°F with low pressure gas and air.
Selas Corp. of America



9. Temperature scanner

Tipptronic's multipoint temperature scanner provides over-temperature or under-temperature protection. It is designed for systems where it is desirable to provide one temperature alarm instrument capable of sensing several control points and providing one alarm if one of these temperatures exceeds or fails to reach a pre-set limit. Thermocouples, ranging from 4 to 56, are connected to a specially built switch. The switch samples the output of each thermocouple. The signal is then delivered to the signal terminals of a contact meter.
Tipptronic Inc.

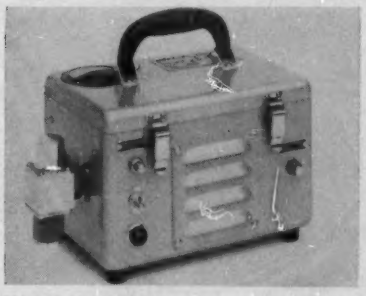


10. Thread protectors

Color-coded pipe thread protectors from Protector Products Inc. cannot damage the pipe threads. They are made of precision molded polyethylene. Interior surface of the protector is tapered at the same angle as the thread so that there is contact for the full thread length.
Protector Products Inc.

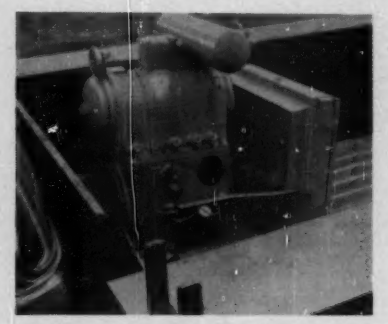
11. Drafting machine

A portable drafting machine, so compact that it can be folded jackknife style to fit in the pocket when detached from its drawing board, takes the place of T-square, ruler, protractor, and triangles. Called Draftette, the precision instrument is available attached to a portable drawing board.
David Miller & Associates



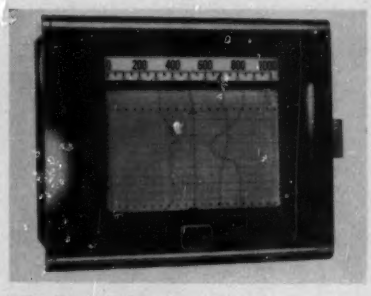
12. Gas alarm

Johnson-Williams has redesigned its portable, audible combustible gas alarm with a visible indicator meter. The Sentinel is designed for confined area use. It features an externally mounted, plug-in filament unit for rapid response to gases.
Johnson-Williams Inc.



13. Truck-mounted compressor

Hydrovane 125RA is a 125-cfm compressor driven direct from the truck engine through a heavy-duty power take-off. The Auto-Air can be mounted directly on the truck chassis or on a platform base. The compressor is of the Davey multi-stage rotary type with a single free-floating rotor.
Davey Compressor Co.



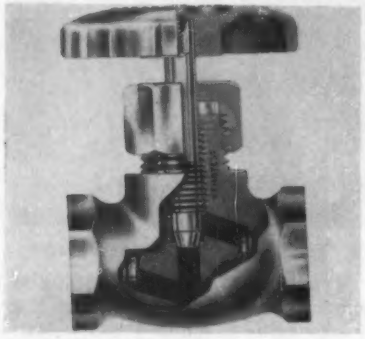
14. Strip-chart

Up to 16 separate records from as many telemetering transmission systems are printed out on Bristol's new telemeter receiver. The multiple-printing strip-chart Metameter telemeter receiver uses a multiple-switching arrangement. The variables need not be all of one kind, but could be a combination of pressure, flow, temperature, liquid level.
Bristol Co.

15. Insulating analyzer

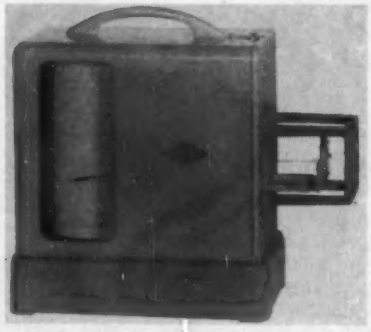
The D-K analyzer from Delsen Corp. is a portable, non-destructive, direct-reading instrument that measures the dissipation factor and dielectric constant of insulating materials. The instrument can be used to check the effects of variables in dielectric systems, to detect non-uniformities in insulators, and to

inspect incoming material to insure conformance to standards.
Delsen Corp.



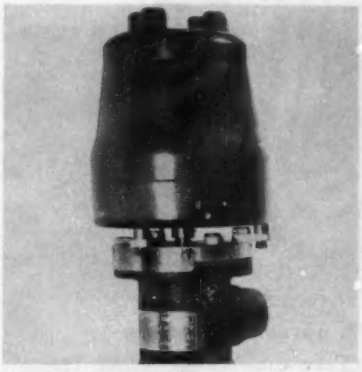
16. Needle valve

Kerotest has developed a new globe-type needle valve for jobs where space is a factor and where operating areas are close. It is suitable for use in meter boxes, pressure gauge controls, as a sampling valve, and in applications where a high-pressure, accurately controlled shutoff needle valve is required.
Kerotest Manufacturing Co.



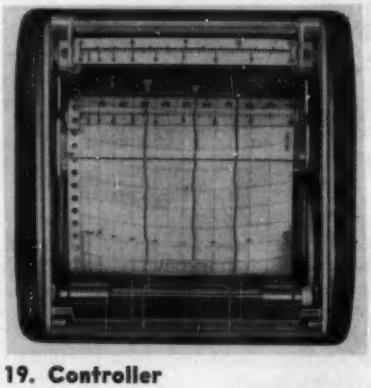
17. "Mycrohygrograph"

Graphing minute changes in ambient relative humidity is possible with a new instrument from Serdex. The Mycrohygrograph uses the sensitive Serdex diaphragm and makes minute changes in relative humidity visible by recording them on an outside chart. Readings to less than 1 per cent relative humidity are possible. The instrument is ideally suited to such tasks as monitoring air conditioning systems which are used to accurately control humidity in many industrial and laboratory operations, including electronic data processing equipment and electronic computer operations.
Serdex Inc.



18. Valve operator

Jordan's explosion-proof electric valve operator provides proportional flow control from a-c or d-c signal. Model SM-11-X mounts directly on the stem of rotary valves. The Valvetrol may provide remote control of the valve from a pushbutton station with meter indication of valve position. Or, it may provide proportional control in automatic systems.
Jordan Co. Inc.

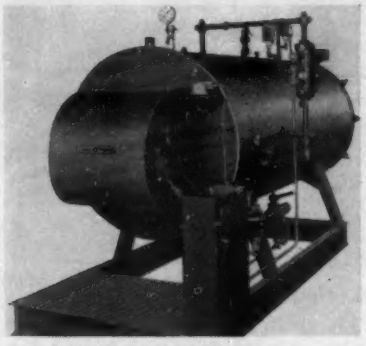


19. Controller

Six new features have been added to the standard panel-type Consotrol instruments from Foxboro. Two of these advances permit greater recorder flexibility. Two automatic control developments extend the number of control actions available with the Model 58 Consotrol controller. A new type chart tear-off bar and a new automatic-manual switch handle are standard with each instrument.
Foxboro Co.

20. Space heater control

Incorporated in Robertshaw's new manual control for space heaters is an automatic pilot safety device. In case of pilot outage, the device completely shuts off flow of gas to both main burner and pilot light. The control knob has a metal stop which prevents accidental shut off of pilot during normal operation. The TSC-110 has been designed for low capacity space heaters.
Robertshaw-Fulton Controls Co.



21. Packaged boilers

A burnerhead designed for the efficient firing and proper mixing of air and gas is featured in a new York-Power Steam-Pak automatic boiler. A blower at the front of the boiler supplies air for combustion and forces hot gases through the boiler passes.
York-Shipley Inc.

TRADE LITERATURE

22. Ball-joint pipe

Molox ball joint pipe for river crossings and submarine service is the subject of a new catalog from American Cast Iron Pipe. The generously illustrated catalog contains instructions for assembly, weight and dimension tables, and installation methods.
American Cast Iron Pipe Co.

23. Process control

Recent developments in the field of "process control by analytical instrumentation" are covered in an eight-page illustrated article available from Schlumberger Well Surveying Corp. Nuclear magnetic resonance and other new analytical processes as improvements in control and detection techniques are examined.
Schlumberger Well Surveying

24. Synthetic lubricant

Major savings in air compressor maintenance costs can be obtained with Pydraul AC, a fire-resistant synthetic lubricant for air compressors, according to a booklet avail-

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able from Monsanto Chemical. The booklet discusses the lubricant, which also reduces carbon deposits on exhaust valves and in interstage equipment.
Monsanto Chemical Co.

25. Directory

Beckman Instruments has published the "Beckman Directory," describing the seven specialized divisions of the company. In addition, the 32-page booklet lists products and sales and service locations.
Beckman Instruments

26. Computer study

A new aid to help management study the electronic computer, its capabilities, operation and applications has been published by Remington Rand Univac division. The 196-page manual is written entirely from the management point of view, and is a fine starting point for a thorough exploration of electronic data processing.
Remington Rand

27. Process control

Four new bulletins from Swartwout Co. describe a completely unitized AutroniC instrument line for indicating, recording, and controlling temperature, pressure, level flow, pH. The informative brochures include progress illustrations showing the functional convenience and flexibility of the design.
Swartwout Co.

28. V-angle compressors

Cooper - Bessemer's Type GMXF V-angle compressors are discussed in a new bulletin (No. 84). Described is the paralleling turbocharging of engine-driven compressors for service from 330 to 825 bhp for use on field gathering, repressuring and refinery service.
Cooper-Bessemer Corp.

29. Valves and controls

Literature on condensed solenoid valve - electromagnetic controls offers condensed information on Automatic Switch Co.'s complete product line. Covered under solenoid valves are 2-way, 3-way, 4-way, corrosion resistant, manual reset and special-purpose valves.
Automatic Switch Co.

30. Orifice meters

American Meter Co. has released five bulletins describing orifice meters and instruments. Covered are integrating orifice meters, gas lift meters, two-position controller for parallel meter operation, Dri-flo orifice meter, and remote pilot unit for remote loading of pressure regulators.
American Meter Co.

31. Audio tone equipment

Transistor audio tone equipment for telemetering, remote indication, remote control, and supervisory control is discussed in a data sheet from Warren Manufacturing Co. The company's Tone-Link transmits a total of up to 18 tones simultaneously over a single pair of private or leased telephone wires.
Warren Manufacturing Co.

32. Commercial thermostat

Rod-and-tube type steam thermostats for use in commercial appliances are discussed in a four-page bulletin from Robertshaw. Cutaway and installation diagrams show the Model SC and ST thermostats, which provide sensitive throttling control for coffee urns, dish washers, sterilizers, steam tables, and similar equipment.
Robertshaw-Fulton Controls Co.

33. Computers

Four sheets of literature have been published by Alwac Corp. One covers the ALWAC II-E desk-top units that provide control of and communication with the computer and round out a basic data processing system. The others discuss a standard card converter, a magnetic drum, and the central computer.
Alwac Corp.

34. Gas chromatographs

Three new pieces of literature describe Beckman's gas chromatographs and accessories. Covered are a low temperature instrument for laboratory separation and analysis of gases and liquids boiling up to 80°C; a versatile, high temperature instrument for analyses of gases of liquids boiling up to 350°C; and the complete line of sampling accessories and column information.
Beckman/Scientific

35. Tank manufacturing

The story of LPG tank manufacturing has been told by Master Tank & Welding Co. in a 16-page, illustrated catalog.
Master Tank & Welding Co.

36. Self-propelled crane

Bulletin CR-502 from Schield Bantam describes a new 7-ton rated self-propelled crane-excavator. The two - color, four - page publication contains detailed information on specifications, features, operating data and capacities.
Schield Bantam Co.

37. "Portrait in Plastics"

A 16-mm movie in sound and color has been produced by the plastics division of Eastman Chemical Products Inc. showing the growth of plastics. The movie, produced as part of the anniversary program commemorating Eastman's first quarter century in tenite plastics production, is described in detail in a new bulletin from the company.
Eastman Chemical Products Inc.

38. Steam jet ejectors

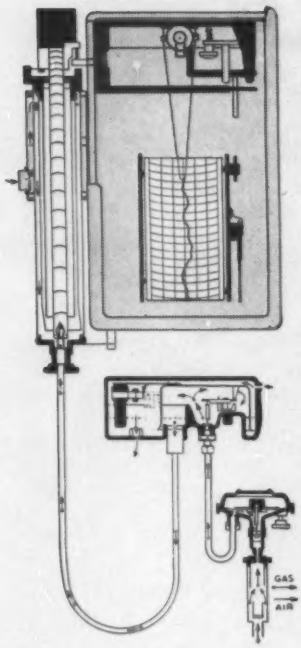
Sweco's new line of steam jet ejectors is presented in a new bulletin. The new line, available in a wide range of sizes with single and multiple stages up to six, has been designed to meet vacuum needs of the power and process industries.
Southwestern Engineering Co.

39. Quality control

The use of automatic equipment to get quality control in the lining of oil field tubing is the subject of a four-page report by Tubular Lining Corp. The report follows the processing method through each step, showing how the "Autotronic" lining method eliminates the possibility of errors and carelessness due to human factors.
Tubular Linings Corp.

40. Surveying Instruments

Literature is available on a film showing the manufacture and use of Kern Swiss optical surveying instruments. The 16-mm film with narration is available on loan.
Kern Instruments Inc.



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Wobbe Index Recorder
THE WORLD'S FIRST

Now, Sigma's Wobbe Index Recorder gives you a continuous record of *actual* thermal delivery.

$$\text{Wobbe Index} = \frac{\text{Calorific Value}}{\sqrt{\text{Specific Gravity}}}$$

This instrument is reliable and relatively inexpensive. Recordings are highly accurate. An optional unit will also control Wobbe Index if desired.

The Flow Regulator regulates gas flow to the burner. It senses slight changes in specific gravity and compensates for changes in barometric pressure and room temperature.

The Recording Mechanism is actuated by the heat of the gas. Responds rapidly to changes in Wobbe Index. Not affected by normal temperature and pressure changes. Highly sensitive, frictionless magnifying system. All parts well protected against corrosion.

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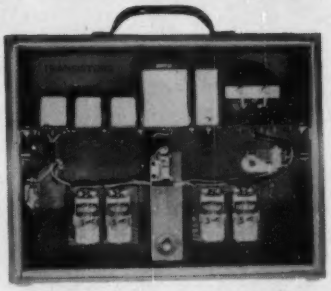
TRANSISTORIZED PIPE LOCATOR

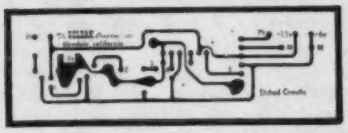
The **GOLDAK COMPANY**
Celebrates its 25th Anniversary with the most effective PIPE LOCATOR *of the Century*



SPECIFICATIONS:

Operating Weight
Transmitter — 4½ lbs.
Receiver — 4¾ lbs.
Circuit
Transmitter — one transistor
Receiver — six transistors
Batteries
Transmitter — 4 size C flashlight cells
Receiver — 4 size C flashlight cells
Sensitivity — 18 ft. depth range, approximately 200 ft. average tracing distance.

Again, Goldak proves their leadership in the locating field with this Transistorized Pipe Locator. Featuring Transistors, Printed Circuit Boards and Packaged Circuits for better locating; small sized Flashlight Batteries for maintenance savings...Transistors and other components encapsulated preventing temperature, humidity, shock, vibration problems. Designed for pinpoint detection of underground pipes, cables, mains, laterals, valves, etc.



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For further information, write The Goldak Company for Literature and name of your nearest dealer.

MANUFACTURERS OF THE WORLD'S FINEST LOCATING EQUIPMENT

people • *Continued*

(*from page* 77)

FRANK E. CAPRISTO is the new dealer promotion manager for three Pittsburgh Group companies of the Columbia Gas System, Manufacturers Light & Heat Co., Columbia Gas of N. Y. Inc., and Cumberland & Allegheny Gas Co. Mr. Capristo joined the business promotion department in 1952. In 1952 he was named assistant dealer manager.

JOHN LAWRENCE, formerly president of Joy Manufacturing Co., has been named vice president of Dresser Industries Inc. He will headquarter in Dallas. Dresser's chairman, H. N. Mallon, states that Mr. Lawrence will play a prominent role in the new Dresser division which will be created following merger of Dresser and Gardner-Denver.

JANET REINHARD has been named Toledo district home service director for Ohio Fuel Gas Co. Miss Reinhard has been a home service advisor in Columbus for Ohio Fuel the past two years.

RICHARD J. MURDY, chief geologist for New York State Natural Gas Corp. since 1952, has joined the parent firm, Consolidated Natural Gas Co., in New York. He will assist vice president E. H. Tollefson in a variety of duties. Before joining New York State, Mr. Murdy served 12 years with Peoples Natural Gas Co., another Consolidated subsidiary.

WILLIAM E. DOBBINS has succeeded the late Gen. Urban Niblo as director of Dresser Industries Washington office. Mr. Dobbins goes to Washington from Houston, where he has been central regional manager for Clark Bros. Co., one of the Dresser Industries. Prior to that, he was manager of the Clark

Frank Capristo
Pittsburgh Group

William E. Dobbins
Dresser Industries

V. J. Eberl
Robertshaw

Wesley Cook
Portland Gas

Bros.-Dresser Industries Washington office and special representative in the New York City area.

FREDERIC V. LACOCK has joined the Stiglitz Corp., Louisville, Ky., as vice president in charge of sales. J. ARTHUR JENKISSON also has joined the company as vice president assisting Mr. Lacock.

V. J. EBERL is now plant superintendent of Robertshaw Thermostat division at Youngwood, Pa. A veteran of 20 years in the manufacture of control devices, Mr. Eberl formerly was plant manager for Wisconsin Metal Products, Racine, Wis.

KENNETH A. PEIFER has been appointed labor relations manager for the Peoples Natural Gas Co., Pittsburgh. Mr. Peifer was with Consolidated Natural Gas Co.'s industrial relations department before his promotion.

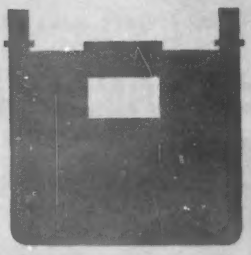
WESLEY A. COOK has been elected a director of Portland (Ore.) Gas & Coke Co. to fill the vacancy created by the retirement of R. G. BARNETT. Mr. Cook has been a vice president of the company since 1955, in charge of rates and other regulatory matters.

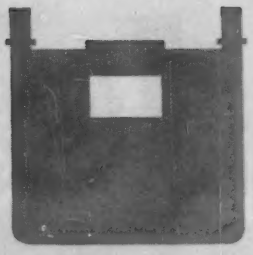
H. G. EBDON, executive vice president of Combustion Engineering Inc., New York, has been named president. He succeeds MARTENS H. ISENBERG, who resigned because of ill health. ARTHUR J. SANTRY, JR., vice president and director, was elected vice chairman.

New vice presidents of Crane Co., Chicago, are MAURICE NELLES and PAUL S. KEMPF. Mr. Nelles is vice president for engineering and Mr. Kempf's field is personnel and industrial relations.

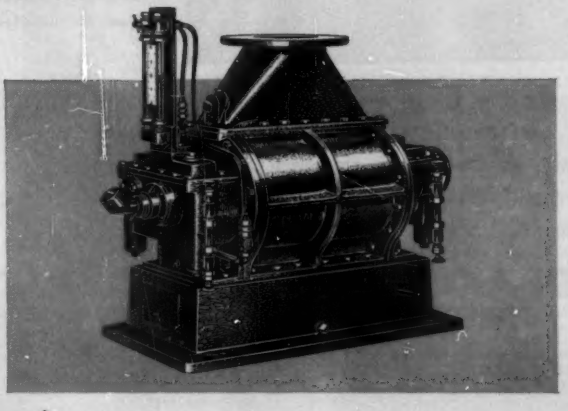
WELDON D. WILLES, assistant to the president of Rockwell Manu-

Why Use Two...





When One Will Do...



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When *one* Roots-Connersville rotary gas meter is used in place of *two* . . . or *three* . . . or *four* of other types, metering costs go down.

This fact has been proved by utility companies and commercial and industrial users of gas everywhere as shown in this typical comparison:

First cost is substantially reduced with the proper selection of the *one* Roots-Connersville meter, from the 39 sizes offered, for a specific requirement. Further savings are made in foundation, piping and installing costs, and in space.

But this is only part of the story. Roots-Connersville gas meters assure unalterable accuracy with far less maintenance than required by other types. There are no valves, valve gear or other small parts to wear out and cause inaccuracies. Servicing is limited to lubrication of bearings and gears and an occasional check of the operating differential.

For additional data, please refer to our section in **Chemical Engineering Catalog** or **Mechanical Catalog** or write for descriptive Bulletin M-152.

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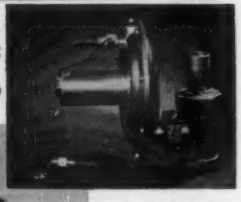

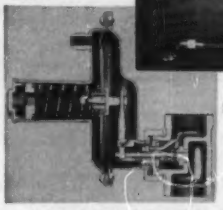

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TYPE 51-R FOR EVERY INSTALLATION

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Exceptionally high relieving capacity obtained by new type internal relief valve. Remarkable by-pass check valve prevents over-shooting of low pressure and damage to meter.

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UNIVERSAL

CONTROLS CORPORATION
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DALLAS 20, TEXAS

people • *Continued*

facturing Co.'s LFM division in Atchison, Kan., has been named general manager of the company's new valve plant at Kearney, Neb. FRED J. LANGTRY, assistant works manager of the Oakland, Calif., plant, has been promoted to works manager at Kearney. Mr. Willes joined Rockwell in 1944 and has since served in managerial capacities at several Rockwell plants. Before joining the LFM division, he was sales manager-Nordstrom valves. Mr. Langtry has been associated with Rockwell at Oakland for 28 years.

URBAN HIPP has succeeded JOHN M. SPENCE as treasurer of Barber-Greene Co., Aurora, Ill. Mr. Spence, one of the company's senior employees, has been treasurer since 1945. He now moves to the newly created post of manager of insurance.

HAROLD G. WARD has been named northern California regional sales manager for Tamco Corp., San Rafael, Calif.

JOHN P. EWING is now manager of manufacturing for Ruud Manufacturing Co., Kalamazoo, Mich.

GEORGE MILLER, assistant chief engineer of Barton Instrument Corp., Monterey Park, Calif., was honored recently by an invitation to participate in the ceremonies marking the 15th anniversary of the first nuclear chain reaction at the University of Chicago. He was so honored because of his contribution to the development of the Pure Nuclear Physics Group of the Manhattan District Project.

P. L. CHABRE has taken on new duties as national sales promotion manager of Utility Appliance Corp. and Mission Appliance Corp., both of Los Angeles. He will also continue as sales manager of Utility's other divisions—Gaffers & Sattler and Occidental range divisions. GEORGE WACK has been named district manager for Gaffers & Sattler and Utility in San Diego county.

W. W. ST. CLAIR has been promoted to general sales manager of O'Keefe & Merritt Co., Los Angeles.

K. H. ROWLAND is now vice president-production of Union Carbide Chemicals Co., Los Angeles. Mr.

Peoples Gas Light & Coke Co. president Joseph J. Hedrick (left) presents suggestion award check of $900 to Guy Howard. Mr. Howard, collection reviewer in the credit and collection department, suggested a new method for reviewing certain applications for gas service. This most recent award brings Mr. Howard's total in his 37-year career with Peoples Gas Light to $1225 for five suggestions.

Rowland, who joined the company in 1934 as an engineer, has been the company's works manager.

R. FRANK NOWLIN, engineer in the Texas distribution division of United Gas Corp., has been promoted and placed in charge of operations in the Houston division. In his new capacity, Mr. Nowlin will be in charge of gas measurement, leakage reduction and other operations.

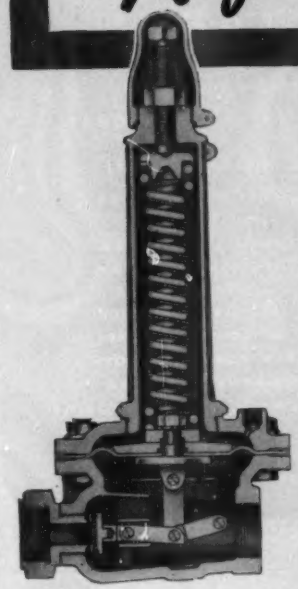
FRANK DORR has been appointed chief corrosion engineer of Standard Magnesium Corp., Tulsa. He will headquarter in the recently opened field office in Houston. Mr. Dorr has operated his own firm, Dorr Engineering Inc.

D. B. BENEDICT has been elected a vice president of Union Carbide Corp. He has been president of Union Carbide Chemicals Co., a

Frank Nowlin
United Gas

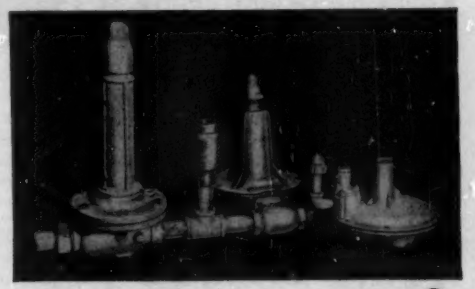
Frank Dorr
Standard

IN THE HIGH PRESSURE FIELD
THERE IS SAFETY
IN *Reynolds...*



Accurate, Safe Control

of tremendous pressures is an ever present problem in the gas field. Reynolds field Regulator illustrated at left is one of the many high pressure regulators built by Reynolds. It is thoroughly tested and proved in service. It handles up to 1,000 pounds safely reducing same to pounds. For more than fifty-five years Reynolds has designed and built gas regulators. Safety, accurate performance, years of service—these are some of the built-in factors responsible for Reynolds enviable position in the Gas Control Field.



Reynolds Gas Regulator Co.
ANDERSON, INDIANA, U. S. A.
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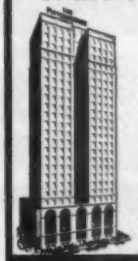
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USED BUTANE—AIR PLANT
In good operating condition.
15,000 cu. ft. per hour capacity, complete with all mixing and vaporizing equipment controls and safety devices. Includes 1—18,000 gallon mixing tank; 1—14,000 gallon liquid storage tank; 1—8,000 gallon surge tank.
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GAS CONSULTANTS—ENGINEERS—CONSTRUCTORS
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people • *Continued*

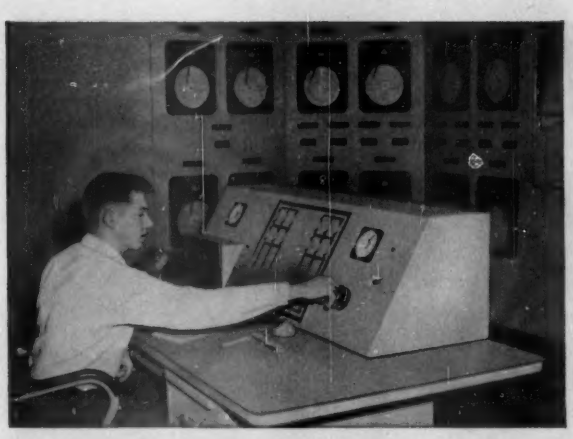
division of the corporation. Also announced is the appointment of E. E. FOGLE as president of Union Carbide Chemicals Co. and of H. D. KINSEY as president of the newly formed Union Carbide Olefins Co.

W. C. HUEBNER is the newly named assistant manager of corporate finance for Ebasco Services Inc. He succeeds F. W. OHLES, who was recently named manager of the department.

Deaths

ROLAND R. PAULIN, vice president and manager of operations of Michigan Consolidated Gas Co., died in Detroit recently. Mr. Paulin, 55, joined the gas company as a cadet engineer in 1926. During the following 10 years he served in the manufacturing department, meter shop and service shop. He became assistant to the merchandise sales manager in 1936, househeating engineer in 1938, supervisor of the industrial department in 1939, assistant to the superintendent of the street department in 1943, and commercial office manager in 1944. In 1949 Mr. Paulin was named assistant manager of operations; in 1950 he became assistant to the executive vice president. That same year he was elected a vice president and was named assistant engineer. In September 1952 he became vice president and manager of operations.

W. C. COLEMAN, founder and chairman of the board of directors of the Coleman Co. Inc., died in Wichita at the age of 87. Mr. Coleman, an inventor and industrialist, was best known for the gasoline lamps, lanterns and portable stoves which carried his name to the far corners of the world. The company he founded at Kingfisher, Okla., in 1900 also was to become a leading manufacturer of heating and air conditioning equipment with factories in Wichita, LaPorte, Ind., Toronto, Canada, and Nijmagen, Holland. Mr. Coleman relinquished the presidency of the company in 1951 and was succeeded by his eldest son, Sheldon Coleman. As chairman of the board of directors, the senior Coleman retained a lively interest in all phases of the business. He kept regular office hours until the day before his death.



ONE man does the work of many...with AMERICAN® telemetering-telecounting equipment

In the largest gathering fields, along the pipelines, in large and small distribution systems, American telemetering and telecounting equipment substantially reduces personnel required for transmission of meter readings. From a central dispatching station, one man instantly obtains accurate flow and pressure readings at remote points and adjusts for load demands with remote-set controllers.

Your American representative can help you benefit by telemetering and telecounting all or any part of your system—large or small.

For Base Volume Indexes— American Telecounters accurately transmit Base Volume index indications of gas quantities computed to base temperature and base pressure conditions, to remote locations.

For further information consult your American Meter representative.

AMERICAN METER COMPANY

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SUPPLIERS TO THE GAS INDUSTRY for Ironcase, Tinned Steelcase, Aluminumcase and Welded Steelcase Meters • American-Westcott Orifice Meters Instruments • Reliance Regulators • Apparatus • Valves

When the Southern California Gas Company planned the Ducommun St., Compressor Station, they anticipated a bad neighborhood relation situation, not to mention an intolerable internal noise condition, unless something was done about quieting the engine compressors.

Logically the problem was turned over to the Burgess-Manning Company . . . specialists in noise elimination. After a scientific analysis of the situation they recommended, designed and built especially engineered Burgess-Manning Air Intake Cleaner Silencers and Burgess-Manning Exhaust Snubbers for each of the eight Ingersoll-Rand Gas Compressors.

In addition, special Burgess-Manning Pulsation Snubbers were installed in the second stage discharge of the compressors to eliminate gas pulsation in the line. As a result, the Ducommun St. Plant is one of the quietest of its type anywhere, an asset to its community and a pleasure to work in. The elimination of pulsation will keep maintenance costs at a minimum.

Successful installations of this kind are possible because of the years of research, study and experiment in the cause and effect of noise that preceded them. Burgess-Manning Engineers are specialists in the elimination of exhaust and intake noise and the pipe line vibration that pyramids maintenance costs.

When such a problem arises in your plant or projected installations, consult Burgess-Manning for a successful, economical solution. They can engineer excessive noise and vibration right out of your equipment and make a "Good Neighbor" out of your plant tool

Eliminate Intake and Exhaust Noise, and Piping Pulsation Problems... Consult Burgess-Manning Engineers

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Sound Engineering

Industrial Silencer Division

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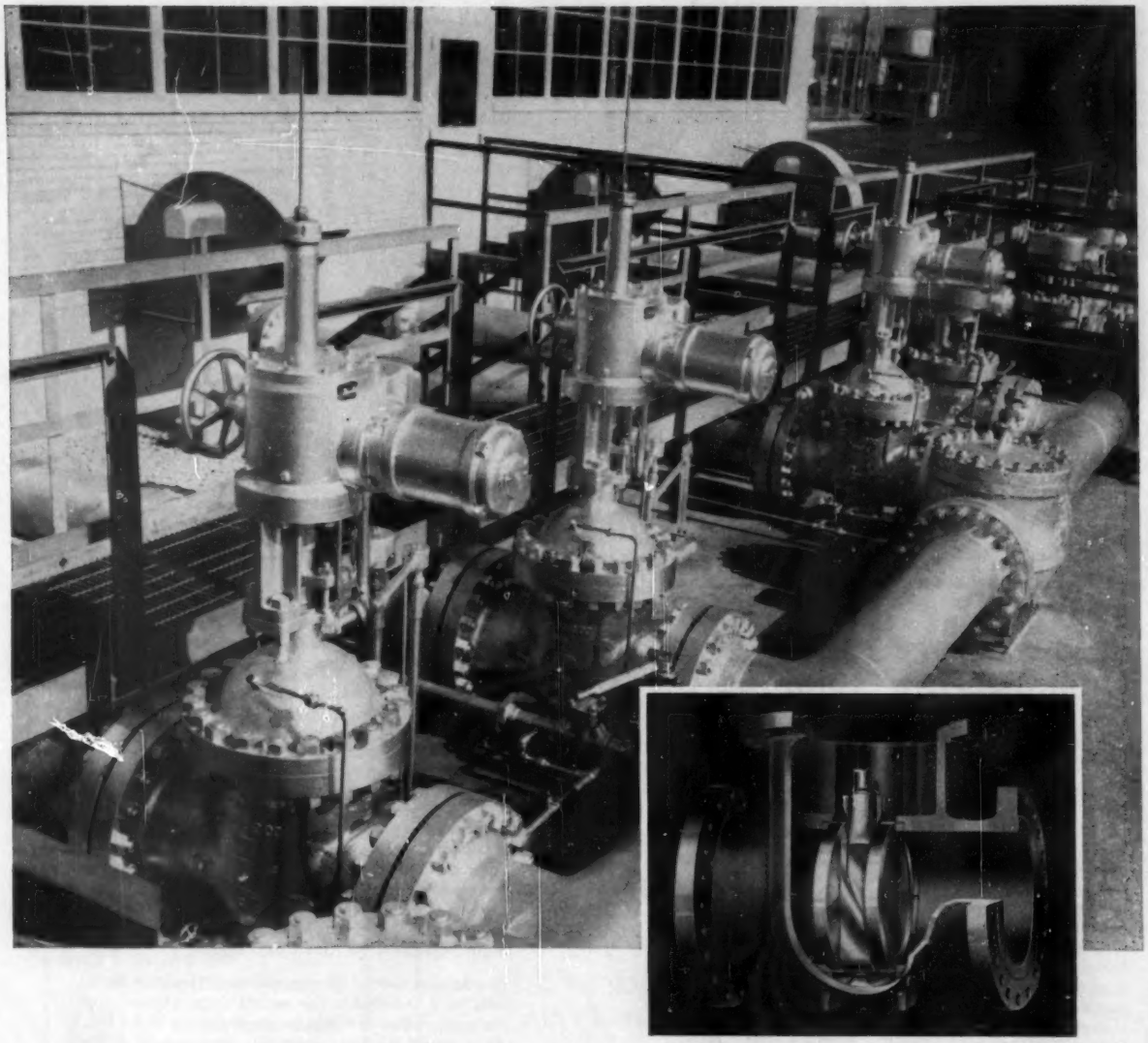

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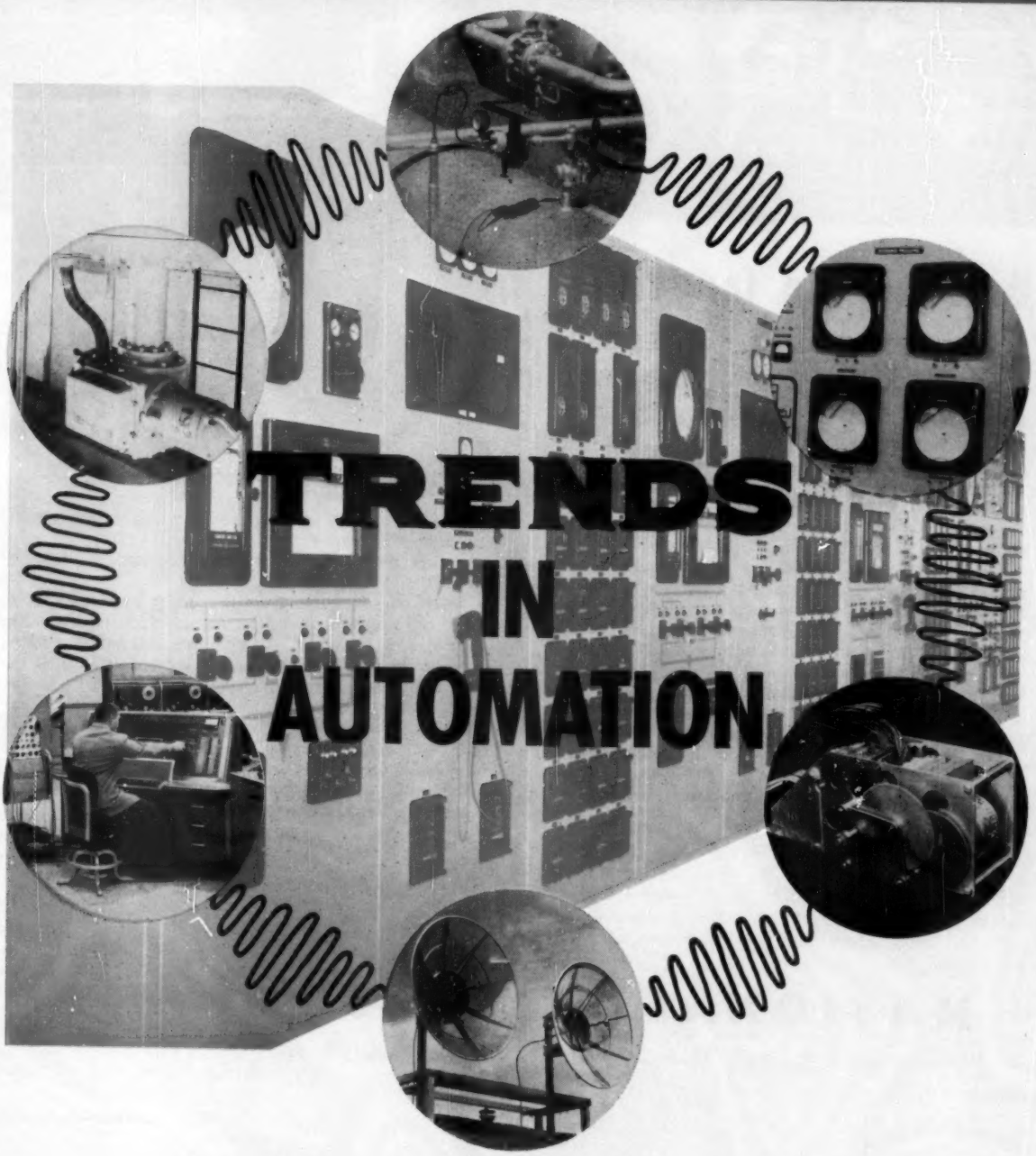
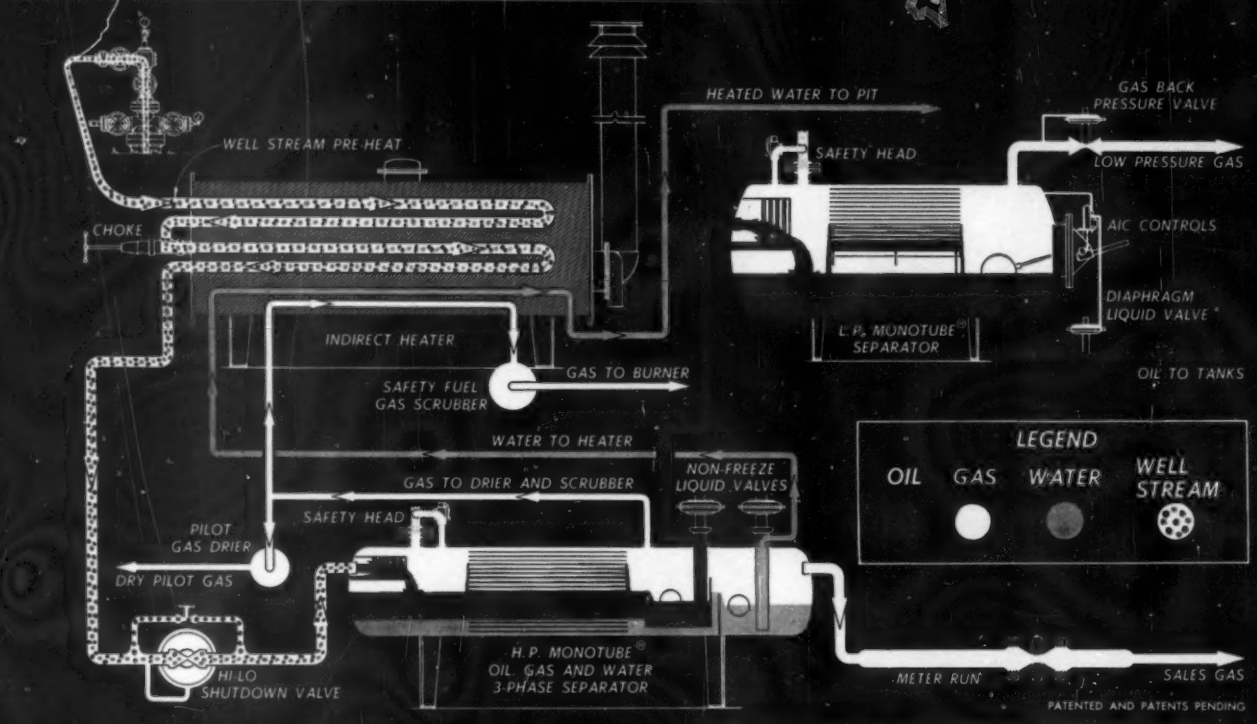


TRENDS IN AUTOMATION



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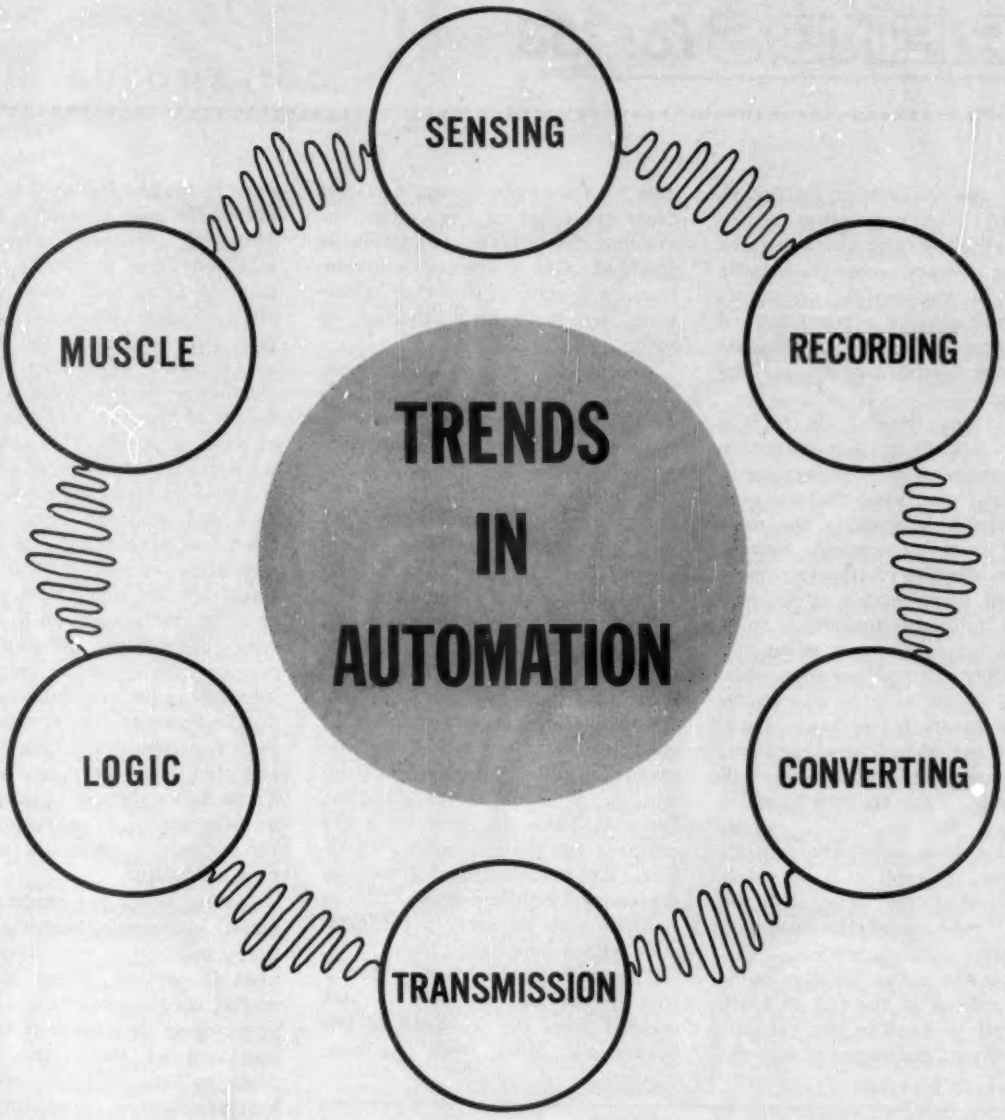


By J. FRED EBDON, Editor

MAN is well designed for operating a gas system. His sensing ability is adequate; his internal communications system is excellent, though he has a somewhat limited external communication range. Some men have fine recording ability. Others can develop it. His actuating devices are usually dependable. But, his best asset by far is his logic device. It has no parallel that even approaches its capability of thinking.

Man has even exceeded himself. Devices and systems have been produced by man that perform sensing, recording, communicating and actuating for him more efficiently than he can with his native equipment. His big problem now is how to use these really impressive mechanisms he has invented.

This problem is the key to gas industry automation progress during 1958. The automatic control devices for most gas system components are here. The problem, how to blend or systemize them into closed-loop control.

Automated control is not new to the gas industry. Actually, it has been basic for many years. A case in point is the pressure regulator. This device operates with simple automation at its best. Central, domestic, gas space-heating systems are another example of gas industry automation. They perform all of their operations through functioning of inanimate objects—excluding construction, maintenance and repair. Some even have the control system equipped with a programmed logic device that obsoletes the need for manual vari-

GAS staff report

ance of the thermostat setting in relation to changing weather.

In 1958, however, there will be a trend toward more automatic control in gas system operation. There will also be a trend toward integrating automation components into more systematic, efficient applications.

Why these trends? It is very simple. A gas company—distribution, transmission or integrated—is charged with rendering its public service obligation in the most efficient and economical manner possible. Market resistance to rate increases alone makes it imperative for automatic techniques to be brought into operations when and where they can produce economies.

The evolution of the gas industry into automated systems operation — other than construction, maintenance and repair — is well under way. Progress will be rapid this year. But automation can be a paradox because it will ruin an operation if applied unwisely; while on the other hand, it is the greatest product of the technical age if well handled.

To see where gas industry automation will be at the end of 1958, it is well to analyze the subject. Construction, maintenance and repair have previously been excluded from our scope of gas system operations for which automation is justified. Gas system automation, then, is control of all other operations by mechanism instead of men.

As has been previously mentioned, dependable equipment is available to perform the jobs done by each of these automation components. The task in 1958 is to continue to bind automatic and remotely controlled devices together with addition of missing components into systems more closely akin to theoretical automation.

To develop automated operations, the gas companies are having to plan far in advance. Basic equipment that goes into a gas system for manual operation now must be easily converted to semi-automatic operation and eventually full-automation. Without astute planning, the automation program for a gas company can easily become a shambles. The application of automatic devices and remote control must be justified step by step in conformance with a long-range plan.

The state of the art of automation in the gas industry is best covered from the wellhead to the burner tip. Much work has been done in the gas industry to produce automatic lease operation and well switching. Wellhead valves can be actuated from a remote point to produce from each well on a desired schedule. Currently, gas company personnel make the decisions as to which wells they will take production from during a desired period of the day, and the number of days per week. This selection is made from correlation of data dealing with system load, reservoir volume and wellhead pressure, contract requirements, price, and allowables by conservation bodies. Gas from the liquid-dust scrubber or oil-gas separator can be metered with conventional differential meters or with electronic continuous-integrating meters that totalize the flow in terms of digital volume corrected to base conditions and compensated for varying pressure. These data (along with others) can be telemetered to a remote point for automatic recording and logging as desired.

In 1958, more gas companies will install automatic techniques to their production operations. The need is obvious. First, time-and-motion studies show that switchers or pumpers may average spending one-third of their time driving from well to well. In some gas-company owned producing areas even more travel time is required. Then, his remaining time may be taken in turning wells on and off; changing charts; checking and logging operation of scrubbers, separators, treaters, heaters, dehydrators, etc. This equipment can be —and in many cases is—operated by automatic devices and instruments.

And we are apt to see some closed-loop automation in gas production operations during the year. Certainly a digital computer can be programmed to make the decision of well selectivity that will produce the most economical and efficient production as conditions (price, load, proration requirements, etc.) change. In fact some companies are using electronic computers for

The basic parts of automation are:

1. **Sensing elements**—instruments that sense given conditions and/or measure variables.
2. **Data converters**—devices that change analogue information to discreet digital values, or vice versa.
3. **Recording devices**—instruments to write down conditions and values of variables sensed.
4. **Communications links**—media for transmitting data that binds automatic elements into a system.
5. **Logic devices**—the controllers and computers that monitor conditions of the variables calculate as required, and initiate action steps that will result in a change to given conditions of a variable or variables.
6. **Actuating mechanisms**—the "muscle" units that actually move, reset, start and stop, adjust, etc., the prime physical components of the gas system.

the work now, but the input and readout are by and for manual action. The input will stay manual for a while. One cannot expect a computer to sense contract changes, gas price increases, and proration changes, etc., but the computers can feed their programmed instructions into supervisory control channels that will actuate the "muscle" components in the automatic well switching set-up. Too, more push-buttons, semi-automatic, remote point well switching systems will be installed during 1958.

Field compressors have been pretty well instrumented and controlled for automatic, unattended operation in the past several years. More of this will be accomplished this year. And as the need for personnel to visit wells and other equipment in the producing areas decreases in volume, and the period between visits increases, this trend will become still more evident.

Control of gathering-line valves is rather easy to accomplish from either a central dispatching point, a nearby pipeline-compressor station operating sub-center, or a closed-loop local control system. The progress for automation in this field for 1958 will be integration with supervisory control of other important gas pipeline components. Delivery-point valves are in similar status.

On the mainline, block valves that sectionalize the pipeline and attend it at river crossings, etc., are also easily automated. Many have been equipped for either automatic operation or semi-automatic (push-button) operation. The transmission segment of the industry has additional programs for providing automatic block-valve operation in 1958. The installation of line-break sensing controls and power valve-operators to block valves previously manually operated, will be a natural step toward automation for 1958.

Blowdown valves, now usually operated manually, are only occasionally equipped with valve operators tied-in with automatic or semi-automatic controls. The trend in 1958 will be to semi-automatic operation.

Heart of transmission system automation is the compressor stations. There are possible economic advantages from automating mainline, natural-gas compressor stations. None is completely automatic at this time. However, some highly-sophisticated semi-automatic remotely-controlled compressor stations are in operation. One transmission company has operated such a compressor station wholly unattended since June 16, 1956, and has proved the dependability. The Federal Power Commission has permitted this company to make the remotely-controlled, unattended station part of its permanent pipeline system. Also, FPC has certificated the addition of four similar stations with equal or advanced degrees of automation. Savings in operating costs have been estimated in the range of 10 to 15 per cent.

This, then, is the point of advance of compressor station automation at the start of 1958:

1. Numerous compressor plants operated by various pipeline companies have local semi-automatic control systems centered at panel boards on the station site, but away from specific engines. Completely automatic and/or semi-automatic sequentially operating alarm, stop-engines, open-station-block-valve-and-close-sidegate-valves, blowdown-station-piping-and-engines, and fire-detecting, etc., control systems augment the prime control system.

2. An unattended, remotely-controlled compressor station is in operation on the Gulf Interstate Gas Co. (Houston) pipeline system. It is located at Stanton, Ky., and controlled from the main engine room of another station at Clementsville, some 80 miles away. Station drive is a reciprocating engine; compression is by a centrifugal blower. In addition, this company has five 8000-hp compressor plants on its mainline designed for local semi-automatic operation on a single-operator-per-shift basis. Gulf Interstate will build and convert more stations to the pattern established by its now-famous "satellite station."

3. Tennessee Gas Transmission Co. (Houston) is installing its station 827 as a remotely-controlled plant with minimum personnel required for operating. It will be a gas turbine-driven, centrifugal blower unit for production of 6700 hp. Station 827 is located at Alexandria, La. — on the Kinder, La., to Portland line— and will be controlled from Kinder.

4. Southern Natural Gas Co. (Birmingham) is completing an unattended, remotely-controlled reciprocating station. Its Olga plant is platform mounted in the semi-offshore country of the Mississippi delta, south of New Orleans. Two 660-hp, packaged, reciprocating engine-compressor units will power the installation. Olga's control center will be at Southern Natural's Toca station, some 42 air-miles distant. Access to Olga is only by seaplane or boat.

For '58, other companies will follow suit to the development of remotely-controlled stations. These and other examples of engine-driven centrifugal blowers, turbine-driven centrifugal blowers, and straight reciprocators in semi-automated applications will be closely studied in the industry.

We can look for one or more pipeline companies to experimentally close the control loop in 1958 by application of a computer in a telemetered-supervisory controlled compressor station set-up. And devices that are necessary for the practical application of full automation will be developed and tested. For example, at unattended cen-

trifugal stations, protection against pipeline surge must be provided even though such an abnormal condition will rarely occur in a well designed system. A true feedback-type, automatic surge-control system has been developed. This device watches the pressure variations at the discharge side of the station and transmits this to a component that goes into operation if pressure starts to oscillate or surge. The surge-control unit then takes programmed steps to control or eliminate the surge condition.

Much study will be directed in '58 to determine the best method for applying automation to particular pipelines. There are two major choices with many variations. Basically, these choices are:

(1) Break the system, for control-operation purposes, into two or more sections and have a complete control center for each, with just reduced, basic data and minimum supervisory control going into and coming out of a master control point for the whole system.

(2) Control and operate from a single, master control center.

There are advantages and disadvantages to each. Only the transmission company involved can say which system is best for applying automation to its specific properties. There are definite decisions that can be made on the basis of a theoretical pipeline system. But, where do you find the theoretically perfect pipeline installed? There is a trend, however, in planning toward controlling as many functions as practical at individual stations to reduce the volume of data transmission and feedback from either section control centers or a master control center.

Distribution systems are also trending to automatic operation. This trend will be given added impetus during 1958. Some distribution systems have attained a relatively high degree of automation. And, some of the basic equipment used in distribution system has been automated — using the term a bit loosely—for years. Telemetering and supervisory control are also relatively old-hat to many distribution companies.

The trend for distribution automation in 1958 will be toward more telemetering and remote control. Those companies that are now using these techniques will be expanding the applications and upgrading the systems — turning to more sophisticated instruments, mechanisms, and techniques. Many gas distributors will take their first steps into telemetering and remote control during 1958.

The principal area for the evolution of automation into distribution operations is the dispatching office. The major steps here for 1958 will be:

1. Multiplexing and complex coding in telemetering systems.

2. Automatic data logging.

3. Positive signalling of system variance trends.

4. Some closed-loop control wherein an electronic logic device will interpret data telemetered in and issue instructions to the distribution system control mechanisms.

The need for such developments arises from the great mass of data that dispatchers must receive, log, make calculations from, and then actually perform their dispatching function. Gas loads controlled by dispatchers have now grown out of proportion to dispatchers' ability to collect, process and reach decision. With large distribution systems that are still expanding, greater loads than ever before and a resulting more-critical necessity for better control of system flow and delivery conditions, it is only natural that gas distribution companies are turning to modern system control equipment and techniques.

There is a trend toward more automated gas measurement in distribution systems. This extends from orifice meter units that measure volume rate of flow and print it out in digital form continuously or on demand, to processing orifice meter charts with electronic computers. Gas measurement for billing purposes remains fairly static in technique, but measurement for system flow control shows a tendency toward electronics. Eventually, instantaneous telemetered gas measurement for system control will work into measurement for billing.

Also in 1958, we will see increased impetus placed on remote operation of basic mechanical equipment in distribution systems. More valves will be operated from control centers; more regulators will be loaded or unloaded from control centers; and there will be more controllers of all types integrated into routine operations. These will include pneumatic, electric relay, and servo actuated motor valves, etc.

The year 1958, then, appears to be one in which important steps toward the fully automated gas system will be taken. It is logical to expect this under the pressure exerted by technical developments in the military, basic science, and in other industries. Gas companies have taken the hesitant approach to automation. This has been wise, perhaps. But, it is no longer wise to do so. Automation is the key to better system control at more economic costs, while still providing proven dependability and safety.

The hard and true fact is that many industries have learned that mechanisms can produce better production quicker. Automation merely speeds communications, inspection, control and operation among mechanisms to produce systemization more in line with the increasing capabilities of the mechanisms.

Gas system operations are a process-type function. It is logical that automation will be used to produce more efficiency in our process. By so doing, gas property operators will be freeing people of some boring chores. They will be freeing more minds to work on system planning and development—creative type thinking. And they will be eliminating from gas system operation the basic problems produced by humans—absenteeism, nerves, emotions, passions and the just plain "goof" decision.

To keep our feet on the ground, it should be pointed out that there is not a single example of a fully-automated distribution or pipeline system in the gas industry. But, hold on to your hats because it is just a matter of time until some company puts a fully-automatic distribution or transmission system into operation. That time looks a lot closer than many think. ■

Tomorrow's AUTOMATED PIPELINE

By NEWTON E. ARMSTRONG

Southwestern Industrial Electronics Co., Houston

THIS is the time to prepare for our nation's ever-increasing demands for gas flow. The challenge is met by detailed planning, a study of equipment requirements and installation of facilities for a completely automatic pipeline. It should not be difficult to see the advantages of pipeline automation. Improvements in system management, employee efficiency and safety are derived concurrently with increased line volume and revenues. Human error is eliminated and constant monitoring of the numerous functions and measurements required in such an extensive operation is available. The automatic pipeline takes into consideration forecasted weather conditions, allowables, contract costs, local shutdowns, etc., and furnishes a continuous supply of gas to meet fluctuating conditions.

Planning

Accepting the fact that complete automation is not something to be accomplished within a short time but depends upon a gradual changeover from manual to semi-automatic to automatic, transmission companies are interested in the methods by which these changes are being made most satisfactorily and with the greatest economy. Existing equipment replacement receives careful attention so that future redesign is not required when full automation is employed. As an example, the necessity of making future replacements of compressors with units which lend themselves to automatic control is obvious. Even more encouragement is necessary toward the present replacement (where required for one reason or another) of automatically actuated valves. Remote reading measuring devices, and communications systems must be suitable for the transmission of measurements, signals and instructions.

GAS exclusive

Power sources

One of the first considerations in the over-all system planning for automation is the availability of power for driving actuators and valves and power for communications and computing equipment. In most cases some form of commercial power service is available. Field gas pressure is used also for satisfactory control of valves and compressors and gas or gasoline power generators supply power for electric or electronic equipment.

Computing equipment

A major part of the cost of an automation system for pipeline transmission is represented in the communications, computing and control equipment. Basic data must be fed into the computing equipment and in its performance as a "brain" it controls actuators for valves, compressors, etc. Measurements of temperatures, pressures, and speeds are obtained from sensing cells known as transducers. The accuracy of a computing system is often remarkable when compared to the accuracy of the sensing element, therefore transducers should be chosen to avoid drift, response variation, mechanical failure and the consequences of temperature and corrosion.

A general pipeline computer is required to make the major decisions and transmit orders necessary for efficient, safe and economical flow programming. This central computer receives manual adjustment for weather forecasts, rate changes, new sales contracts and flow problems. It also receives automatic measurements of instantaneous flow rates at sales points and branch gathering system entry points and flow rate at main line compressor stations. From this data the general computer estab-

lishes the desired flow rate for each main line compressor station by timed flow reset commands.

At the compressor station location another computer intercepts indications of operating conditions on the line. These measurements include flow rate (determined by automatic computation from static and differential pressures and temperatures at an orifice plate) and pressures, temperatures, fire indication, etc. Equipment failure trouble signals are automatically transmitted to the nearest maintenance station, such as:

1. **Equipment failure—minor**
2. **Equipment failure—shutdown—no repair necessary**
3. **Equipment failure—shutdown—repair necessary**
4. **Disaster**

The compressor station computer controller transmits flow rates, maximum flow rates, emergency signals and maintains compressor speeds, valve settings, pressure adjustments and affects other necessary controls. It also starts and stops the compressor cycling on demand when shutdown is required. Where a whole lease, lease block, or gathering system must be treated as a single unit in the entire system, substation computer controllers are required. These units transmit flow rate and maximum flow rate to the general pipeline computer from which instructions are given automatically to set the unit flow rate. Upon receipt of data on contracts, allowables, shutdowns, etc., the substation computer controller issues commands to well head compressor stations, well head flow controls, and establishes individual flow rates.

Data transmission

Since pipeline communications are costly, careful planning and efficient combinations of new and existing facilities bring substantial reductions. Radio transmission in pipeline activity is usually accomplished through microwave channels; other radio channels are not readily available. Radio and wire line transmission are somewhat comparable, but for long distances point-to-point microwave equipment is often more economical. A detailed study of the location, terrain, existing leasable low speed control channels of utility companies and the general system requirements reveals the most satisfactory and economical communications choice. Though the following items are expensive, elimination of any one invites system failure.

1. **Reliable transmitting and receiving components**
2. **Transistor and magnetic amplifier circuitry**
3. **Digital pulse transmission**
4. **Check coding for noise-signal separation**
5. **Data storage until verification of signal reception**

Step-by-step progress

The steps in complete automation begin with *manual* and then *semi-automatic* and end in *remote setting automatic* and eventually *full automation*. Where complete automation is anticipated in the future the eventual system is laid out in detail and plans are made as early as possible. Measuring devices, compressor cycling equipment and valves which are used in manual installations are chosen to be suitable for use in the completely automatic system. Measurement devices are electrical types and all operate on similar signals and voltages. The signals from the measuring equipment are capable of electronic switching and manual control. To permit high speed response required in full automation actual flow rates rather than pressures are measured, digital techniques are used, reliable equipment is utilized and control is exercised with solid state devices (transistorized circuitry and magnetic amplifiers). With no additional refinements this arrangement is known as *manual* operation.

Semi-automatic

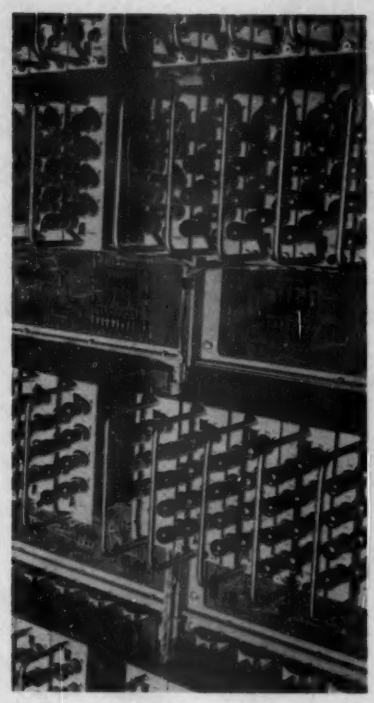
The next step in automation is the *semi-automatic* stage where sequence controllers are installed which receive the compressor station starting information and select each succeeding step in proper order. They provide the four trouble signals listed above when malfunction occurs. The sequence controllers also provide manual control of flow rate and furnish continuous comparison of actual flow rate with the prescribed setting and adjust the flow rate automatically.

Remote setting automatic

Advancing further a telemetering unit is attached to the controller which reads the information stored in the controller on demand, converts to coded data, and transmits to desired locations. Such data may be sent only to the maintenance station for relay or the trouble information may be sent to the maintenance station and flow rate and maximum flow rate to the central dispatching office. In either case telemetering equipment at the receiving point transmits signals to all compressor stations connected, selects flow rates, and receives and displays the four equipment failure trouble signals. On receipt of data, automatic interrogation of the compressor stations is made in sequence and answers are automatically printed out as received. This stage of automation progress is termed *remote setting automatic*. All local measurement points in compressor stations are automatic with remote reset provisions, trouble signals are relayed to maintenance people at remote locations, necessary information for general system control is telemetered automatically to a general dispatching office, and means for remote reset of all controls is available from the central office.

Full automatic

When the general pipeline computer is connected directly to all telemetering terminals at the central dispatching office *full automatic* operation is achieved. The general pipeline computer completely controls the system and information including weather data, market fluctuations, contract changes, etc., can be manually introduced. Taking this automatic and manually-set data the general pipeline computer provides continuous and instantaneous control and through the solution of equations arrives at the most practical, efficient, safe, and economical transmission of gas over the entire length of the system. ■



TRENDS for '58

IN ELECTRONIC COMPUTERS

Trend toward increased use of computers will be pronounced in 1958

By J. FRED EBDON, Editor

GAS companies—both distribution and pipeline—are tending toward increased use of electronic computational-data processing devices. This trend will be even more pronounced during 1958. These facts were revealed in *GAS'* just-completed survey into the gas industry's utilization of electronic computers.

Currently, the largest gas-industry use for computers is in data-processing systems in the general accounting-bookkeeping-billing operations. The routine, repetitious nature of such work particularly lends itself to high-speed data handling and computing machines. The survey indicates that this area has been, and will continue to be during 1958, the primary application point for computers.

Engineers have expanded their use of computers for design, gas measurement and technical statistical studies. The use by gas engineers has increased 61.5 per cent during the past three years. *GAS'* survey tells us we can expect this trend to continue—at an accelerated rate—during 1958.

A tabulation showing some of the reporting gas companies that are using computers as such or as integrated with high-speed data-processing systems, is shown on *Table 1.* There are other gas companies using electronic gear for faster-than-thought computing. But this list represents the majority of the companies with well-developed programs for the more sophisticated uses. The generalized areas of gas companies' utilization of electronic computers is also shown on the table.

In addition, Baltimore Gas Co. has a McIlroy Network Analyzer; as do Laclede Gas Co. (St. Louis); Public Service Electric & Gas Co. (Newark, N. J.); and Southern California Gas Co. (Los Angeles). These analogue flow analyzers are used for distribution network analysis. Then, Laclede uses some IBM-CPC equipment and has scheduled installation of an IBM-650 for August 1958. United Gas Corp. uses a self-designed and made DC network calculator (linear function analogue computer) in distribution engineering for the Texas administrative office at Houston.

Southern Natural Gas Co. (Birmingham) uses an IBM-604 card-programmed computer, with augmenting equipment in a data processing system. They make both accounting and engineering applications. Southern Union Gas Co. (Dallas) has IBM-604 equipment which they use for accounting and some engineering work; and Transcontinental Gas Pipe Line Corp. (Houston) makes use of card-programmed equipment for both accounting and some engineering problems.

A recent installation of a computer has been made by New England Gas & Electric Association Service Corp. This group of Boston-area gas companies has pooled funds, purchased a McIlroy Fluid Network Analyzer and donated it to Tufts University at Medford, Mass. The NEGEA Service Corp. participating companies will use the analyzer for their own system network problems and, at the same time, make the analogue computer available to Tufts for analyses and undergraduate study.

Generous studies and plans relating to electronic computers will be put into operation during 1958. New applications are being developed and new equipment will be installed. *GAS'* computer survey shows that at least 45 gas companies have active study groups or plans to apply, or further apply,

either digital or analogue computing equipment to their operations. Twelve of these companies have targeted a date for the installation of original or more computers. Another 13 gas companies indicated in the survey that they now plan purchase of computing equipment, but have not set the specific target date for installation. Thus, we see 25 gas industry units actively turning to new or additional high-speed computers. *(see Table 2).*

Many of the survey's participants hope that by bringing electronic computing into their operations they will be using another tool that will help them fight the battle of higher-revenue, lower-earnings during the year. Certainly this battle will be joined by most gas companies in 1958.

The prime use in the gas industry for electronic calculation is in the accounting-bookkeeping field. As seen from *Table 1*, 33 gas companies make this application of

Table 1. Here are the ways some gas companies use electronic computers and data processing equipment.

Name of Company	Engineering and Design	Billing	Accounting and Bookkeeping	Record Maintenance and Storage	Other	Type of Computer Used
Arizona Public Service Co., Phoenix	..	●	●	..	●	Univac I
Arkansas Louisiana Gas Co., Shreveport	..	..	●	..	..	IBM 602-A (2 units)
Atlanta (Ga.) Gas Light Co.	..	●	●	..	●	IBM 607
Boston (Mass.) Gas Co.	..	●	●	..	..	IBM 604
Brooklyn (N. Y.) Union Gas Co.	..	●	●	..	..	IBM 604
Central Elec. & Gas Co., Lincoln, Nebr.	..	●	●	..	..	IBM 604
Central Hudson Gas & Elec. Corp., Poughkeepsie, N. Y.	..	●	●	..	●	IBM 604
Cincinnati (Ohio) Gas & Elec. Co.	●	●	..	..	●	IBM 650
Cities Service Gas Co., Okla. City, Okla.	..	●	●	..	●	IBM 604
Colorado Interstate Gas Co., Colo. Springs	●	●	●	..	●	IBM 650
Columbia Gas System Service Corp., New York City	●	●	..	..	..	McIlroy, Std. Elec. Time IBM 650 (2 units)
Consolidated Edison Co. of New York	..	..	●	●	●	IBM 705
Consolidated Gas Utilities Corp., Okla. City, Okla.	..	●	●	..	●	IBM 604
Consumers Power Co., Jackson, Mich.	..	..	●	..	..	IBM 604
Delaware Power & Light Co., Wilmington	..	●	..	..	..	IBM 604
East Ohio Gas Co., Cleveland	..	●	●	●	●	IBM 604
El Paso (Texas) Natural Gas Co.	●	●	●	..	..	IBM 650 (2 units); IBM 604
Hope Natural Gas Co., Clarksburg, W. Va.	..	●	●	●	..	IBM 60A
Houston (Texas) Natural Gas Corp.	..	●	●	..	..	IBM 604; IBM 607
Iowa Elec. Light & Power Co., Cedar Rapids	..	●	●	●	..	IBM 604
Iroquois Gas Corp., Buffalo, N. Y.	..	●	..	..	..	IBM 650
Lone Star Gas Co., Dallas	..	●	●	..	..	IBM 604 (2 units)
Manufacturers Light & Heat Co., Pittsburgh	..	●	●	..	..	IBM 604
Michigan Consolidated Gas Co., Detroit	..	●	●	..	..	IBM 604 (3 units)
Milwaukee (Wis.) Gas Light Co.	..	●	●	..	..	IBM 604
Natural Gas Pipeline Co. of America, Chicago	●	..	●	..	..	IBM 650; 604
New Jersey Natural Gas Co., Asbury Park	..	●	..	..	..	Univac 60
Northern Natural Gas Co., Omaha, Nebr.	●	..	..	..	●	Datatron 205
Oklahoma Natural Gas Co., Tulsa	..	●	●	..	..	IBM 604
Pacific Northwest Pipeline Corp., Salt Lake City, Utah	..	●	●	..	●	IBM 604
Panhandle Eastern Pipe Line Co., Kansas City, Mo.	●	..	●	..	..	IBM 604; 607
Philadelphia (Pa.) Electric Co.	●	..	..	..	●	McIlroy, Std. Elec. Time, IBM 650
Philadelphia (Pa.) Gas Works	●	●	●	..	..	IBM 604; 650
Portland (Ore.) Gas & Coke Co.	..	●	..	..	●	IBM 604
Public Service Co. of Colorado, Denver	..	●	●	..	..	IBM 607
Rochester (N. Y.) Gas & Elec. Corp.	..	●	..	..	..	IBM 607
San Diego (Calif.) Gas & Elec. Co.	..	..	●	..	..	IBM 604
Southern Counties Gas Co., Los Angeles	..	●	●	..	..	IBM 604 (5 units)
Tennessee Gas Transmission Co., Houston, Texas	●	●	●	●	..	IBM 607; 650 (3 units)
Texas Gas Transmission Corp., Owensboro, Ky.	●	..	●	●	..	Bendix G-15D; IBM 604
United Gas Corp., Shreveport, La.	●	..	●	..	..	IBM 650; Datatron
Washington Natural Gas Co., Seattle	●	●	●	..	..	IBM 602-A

their computers. Billing runs a very close second with 32 gas companies using electronic machines for this purpose. Over 21 gas companies (including the 14 listed on the table) apply digital or analogue computers to engineering work. And 6 companies in the gas industry use installed electronic computing equipment for record maintenance and storage; while 13 companies have made other, additional applications.

This year will see a trend toward additional applications for electronic computers installed by gas companies. Some applications that will become more widely used during 1958 are:

Dividends preparation and other stockholder accounting.

Gas measurement operations.

Natural gas well production scheduling, including contracts, rates and proration.

Gas reserve, and gas purchase and royalty calculations.

Plant, stores and vehicle accounting, with emphasis on materials and supply inventory control.

Gas load and interruption studies and records.

Preparation of monthly financial statements.

Reduction of mass-spectrometer data for gas analysis.

Perhaps the most interesting application that will develop during '58 will be initial steps in applying electronic computers to automatic control of gas system components —both pipeline and distribution. This will be a milestone in the gas industry. The installation of logic devices to close control loops in 1958 will point toward more evolution to the completely automatic distribution system and fully automated pipeline. These 1958 efforts will be localized, largely experimental and a far cry from the application of computers under the ultimate automated systems, but they will be very important steps.

Areas for such applications can include regulator stations, measurement stations, pipeline compressor stations, key flow control valves, etc. A typical field for computer application will be in the distribution system dispatching operation. There is a need for mechanisms to digest the mass of data dispatchers must monitor and do something about them on a pre-programmed basis. Several systems of semi-automatic data processing for this application are in operation now. They are the stepping stones to automatic data processing and operation with computers.

Naturally, the computers can't think and they will actually be carrying out the logic (program) read into them by operating personnel. The computer will be doing nothing concerning flow calculations, data form conversion, storage, and print out that is not being done by data logging systems now in operation in the gas industry. However, in the most sophisticated applications now operating in our industry, people still monitor the data, make the logical decisions, and push the buttons and switches that remotely operate system mechanisms. Data handling, decision making from a set program, and initiation of action for actual gas system operation will be the target for computers in distribution system control during 1958.

An interesting, progressive application of computers in the transmission end of the gas business for 1958 will also be in the area of automation. Compressor station operation will be the target. The need arises from the financial picture of the pipeline companies and from the trend to locate stations offshore, in swamp lands or in other areas where the maintenance of personnel is expensive and relatively unpleasant to the personnel involved.

The year 1958 will see small, specialized electronic computers utilized to monitor and control operation of unattended compressor plants operated by local automatic controls. Of more far-reaching significance will be the use of computers for the faster-than-thought logic units tied-in with remotely controlled compressor stations. And, much work will be done to produce computer control of a pipeline system. The latter application will utilize larger, more conventional computing equipment.

The subject of operating a natural gas pipeline compressor station has been well-covered in recent literature. Basically, the art has advanced to the point where data on station variables are telemetered to a control center some miles away. The controlled center is manned. The operator there controls the remote, unattended station through push-button operations. The next logical step is a specialized computer to process the telemetered operating information, check values for compliance with a stored range, and render decisions for adjustments as needed that are fed back to the actuating mechanisms in the remotely-controlled station. This is a simple, straightforward computer application that we are very apt to see during 1958.

This step will be an important one in the move toward controlling a fully automated pipeline with a computer or computers. This concept is not as unbelievable as one might initially think. The computing equipment and the art of using it is developing at a fantastic rate. Specialized computers for local compressor station control are well along in development. A general purpose pipeline computer—designed specifically for full automatic pipeline control and operation—should be out of the design stage and a reality (if not out on actual test) during the latter months of 1958.

Integration of computers in data-processing systems of both distribution and pipeline companies has practically limitless possibilities. The trend in 1958 will be toward the really complete, sophisticated system. More filing will be done electronically in 1958. Units with greater-than-ever memory capacity and operating at internal speeds matching those for the "pure" computers will be handling all manner of gas company records at reduced costs. The accent will be on electronic filing units that can be added to incrementally and easily integrated with very high-speed, internally programmed, digital computers. Implemental auxiliaries can be punched-card alphanumeric input-output system, perforated tape, magnetc tape, punched cards, decimal keyboard, Flexawriter, line printer, etc., etc. In fact, the computer today can be augmented with

Continued on page 106

New 350-mile "Oklahoma Extension"

taps new field...

A. O. Smith furnished 262 miles of the 26-inch pipe. Photo above shows some of the difficult conditions encountered in putting in the line.

Natural Gas Pipeline Company of America puts line into service in late November of '57

This new line (mainly 26-inch pipe) allows Natural Gas Pipeline to augment existing supplies from their fields in the Texas Panhandle. With the new line, they'll be able to increase reserves up to 127,000,000 cubic feet per day from new fields in Jack and Wise Counties, Texas.

The Oklahoma Extension will tie in with the Company's mainline at a point near Fritch, northeast of Amarillo. It represents better than a 10% addition to their present pipeline network that includes 1400 miles for affiliate Texas-Illinois Natural Gas Pipeline Company and 1700 miles for Natural Gas Pipeline Company.

262 miles — of 26-inch pipe was furnished by A. O. Smith. In fact Natural Gas Pipeline Company and A. O. Smith have enjoyed a long and mutually satisfactory association. Over 1000 miles of the 30-inch pipe for the previously mentioned Texas-Illinois line was also supplied by A. O. Smith.

For almost 30 years . . . A. O. Smith line pipe has always been manufactured to a high standard of quality . . . precisely controlled at every step of production. That's why A. O. Smith pipe, made and installed in 1928, is still in operation. That's why so much A. O. Smith pipe is in nearly every important high-pressure line.

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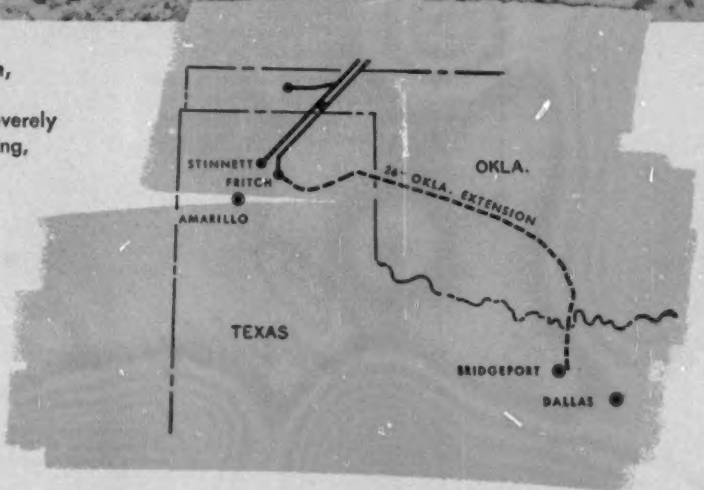
:expands reserves

Construction of the Oklahoma Extension, a four-month project, included erection of suspension bridges to carry the pipe over severely eroded terrain and a number of soil-conserving, erosion-control dams.



The 350-mile line extends from newly tapped fields in Jack and Wise Counties in Texas and swings north into Oklahoma and then back into the Panhandle to tie in with the Company's existing mainline near Fritch, Texas.

QUICK FACTS on

Cooper-Bessemer's new...

V-Angle compressor development

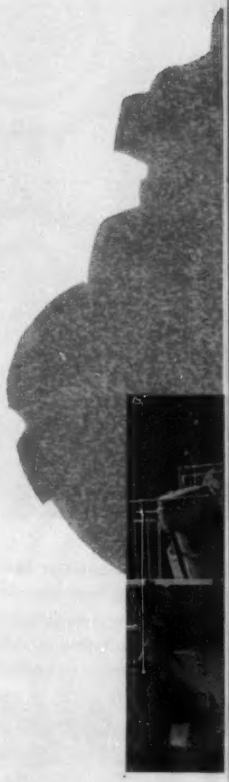
Cooper-Bessemer Series Turbocharging is a unique and two-fold advancement.

* *It offers a range of V-Angle compressors having greatly increased power and efficiency.*
* *It overcomes the inherent shortcomings of other and previous type gas engine supercharging systems.*

The accompanying diagram clearly shows the series arrangement of exhaust-driven and engine-driven air compressors, followed by aftercooling. It assures not only an abundant supply of properly cooled combustion and scavenging air, but also provides high efficiency turbocharging from the moment the engine starts and throughout *all* loads and speeds! At no time is the engine completely dependent on exhaust pressure or heat for its supercharging efficiency.

The net result is what counts! Series Turbocharging now assures at least 40% more power . . . much greater fuel economy . . . lower-than-ever cost per horsepower for housing, foundation, piping, supervision and maintenance . . . *full rated power* for high altitudes . . . and completely dependable, trouble-free performance, fully field-proved!

For further details on Series Turbocharged GMVC and GMWC V-Angles, from 720 to 3500 bhp, send for Bulletin ST-82 or contact the nearest Cooper-Bessemer office.



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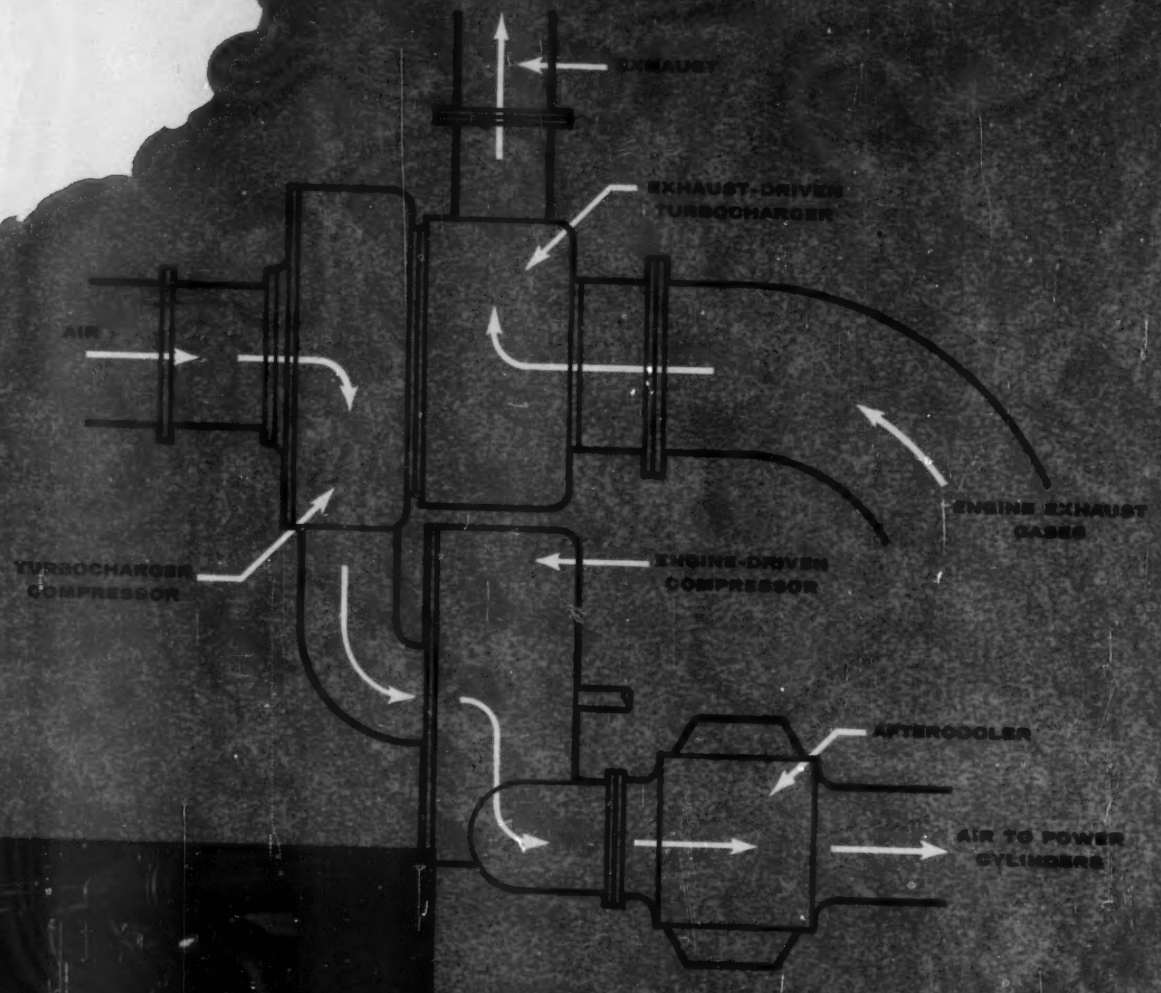

Operational Diagram of Cooper-Bessemer Series Turbocharging

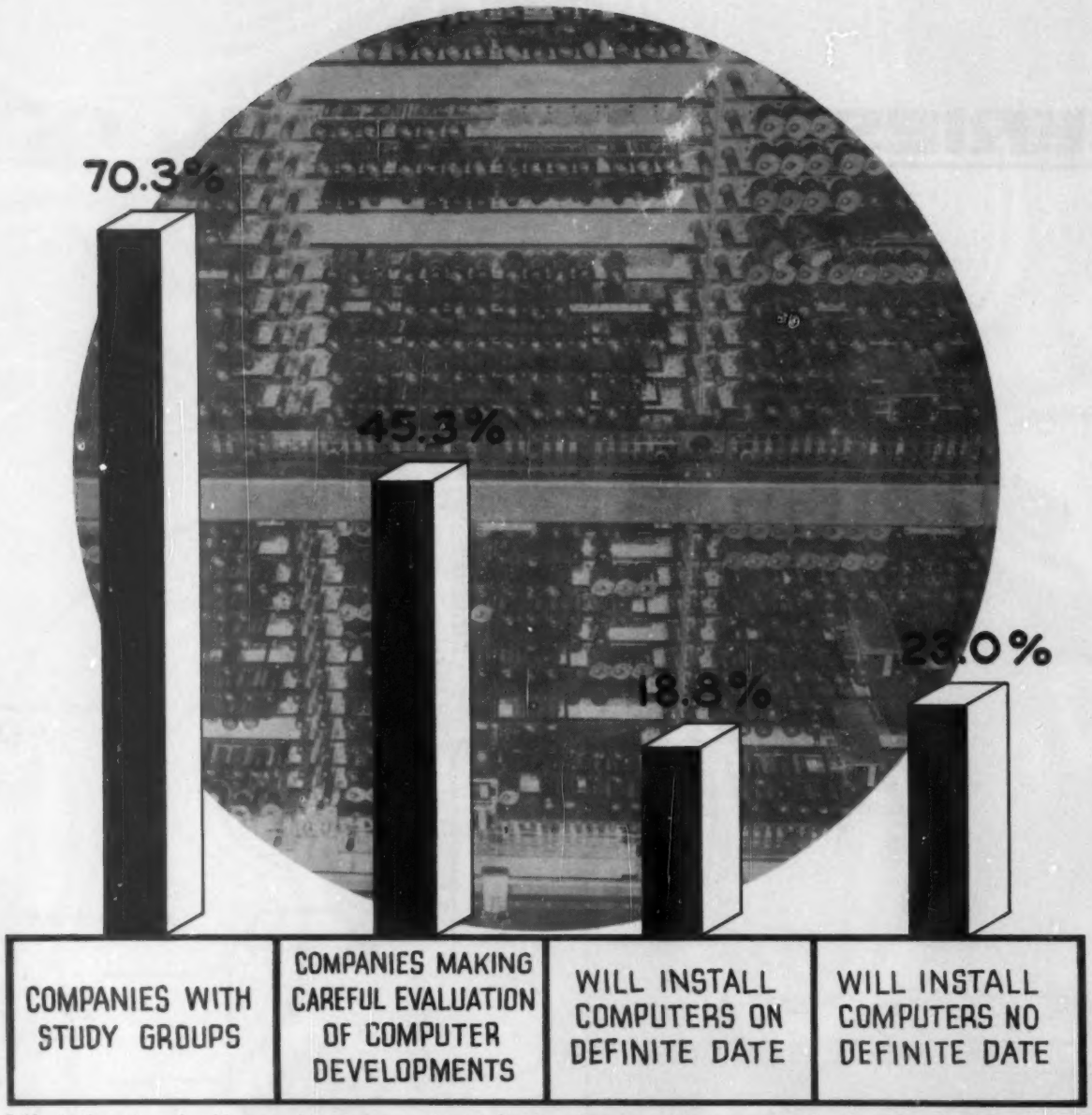

Table 2. Percentage breakdown on how gas companies are keeping abreast of latest computer developments, and their plans for possible installation. Figures were obtained from recent GAS survey.

Continued from page 103

the flexibility of equipment and functions to produce the results wanted. We have seen only the start of electronic data-processing systems. The gas industry will move well along toward the goal of using electronic data-processing systems to handle the complete routine of gas company accounting during 1958. *GAS'* recent computer survey clearly shows the emphasis gas companies are placing on electronic business systems.

The survey reveals that more gas companies are turning to electronic computers for pipeline and distribution system design. And gas companies undertaking the study and planning that will eventually lead to such work—a healthy slice of this planning is aimed at fulfillment during '58—have more than doubled in the past three years. The trend is on toward exchanging computer-seconds for engineering man-hours.

Electronic computers are in American industry to stay. They have not entered industry in general or the gas industry in particular without exacting a price. Nothing progressive does. But they are also proving their worth and fast developing the field for economic computation and data-handling in the gas industry.

The gas industry is in a technical age. In 1958 we will have more emphasis on technology. Gas companies will use computers as another tool produced by technology to help them in their efforts to render the best possible service to customers, at the lowest possible cost consistent with employee and stockholder interests. ■

Tubing stretch mill, Youngstown, Ohio. Electronically controlled mill to be completed during second quarter of 1958 . . . will provide increased production for Tubing comparable to our increased capacity for Casing. Both Upset Finishing Mill and this facility will greatly augment our existing No. 1 and No. 2 Seamless Mills in Youngstown. Photo shows mill building under construction.

NEW MILLS FOR BIGGER MARKETS

Two years ago, ground was broken for our three new seamless Pipe facilities. The express purpose of this massive expansion program was to make YOUNGSTOWN'S production capacity and seamless pipe product mix conform to the future needs of the Oil and Gas Industries. These seamless pipe facilities are now integrated with your demands. This means you can look to YOUNGSTOWN for a full line of Oil Country Tubular Goods without limitations as to size, grade or finish in Drill Pipe, Casing, Tubing and Line Pipe!

No. 3 seamless mill, Indiana Harbor, Indiana. Fully automated, ultra modern mill . . . began operating September 30. Contains world's largest Rotary Billet Heating Furnace . . . adds to our over-all capacity in both alloy and carbon casing. Offers API casing in sizes 4½", 5", 5½" and 7", in grades H-40, J-55, N-80, in ranges 2 and 3 . . . plus line pipe in sizes 4½", 5⅝" and 6⅝" O.D. in grades A, B, X-42, A106, A53 in single and double random lengths. Photo shows Rotary Furnace in foreground.

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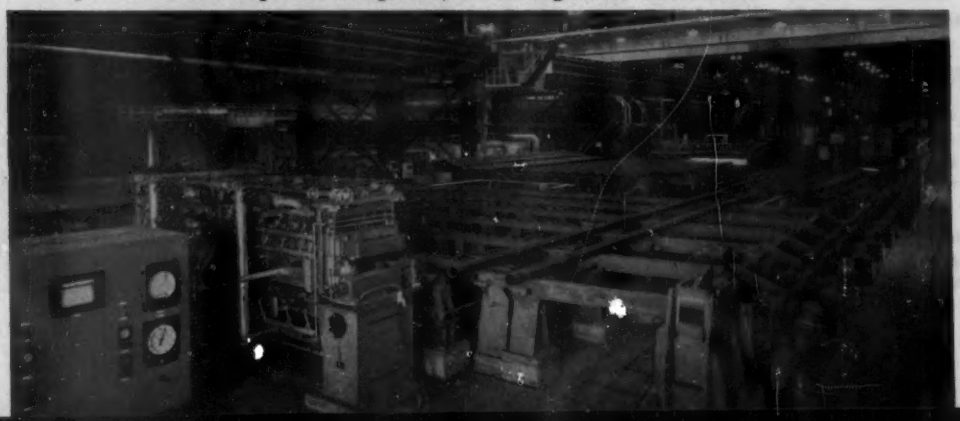
Manufacturers of Carbon, Alloy and Yoloy Steels

Youngstown, Ohio

Upset finishing mill, Youngstown, Ohio. Also a fully automated mill began operations September 15. Contains a pair of automatic upsetters with attendant furnaces plus a full-length normalizing furnace for highest quality control of all products. This mill adds to our capacity for Drill Pipe in grades D, E, x-95 and in Upset Casing (Speedtite). Photo shows upsetter and control panel in foreground, normalizing furnace in left rear.



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MORE USER BENEFITS THAN ANY OTHER RELIEF VALVE!

BUBBLE-TIGHT CLOSURE

At high pressure or low, on gas or liquid, Garrett Relief Valves effect positive seals – give freedom from weep and simmer – eliminate wire-drawing and cutting at seat and disk.

GREATER RELIEF CAPACITY

With a high lift plunger that moves instantly to full open position, Garrett Relief Valves provide full line capacity relief the moment set pressure is reached.

ACCURACY

Garrett's design provides for a pressure opened, pressure closed main plunger. Two small precision springs, which operate independently of each other, control opening and closing pressures. Far greater accuracy is obtained than is possible when one heavy spring must control both functions.

DURABILITY

The main plunger in Garrett Relief Valves is snap-acting on both opening and closing movement. The valve is not subject to wire-drawing and cutting at the seat and disk. Soft seats are enclosed by metal, and fully protected against the blast of expanding gas or liquid when the valve is open.

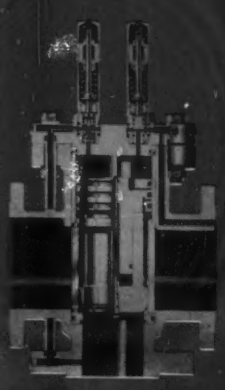
VERSATILITY

A Garrett Relief Valve will serve simultaneously as a safety shut-down valve and a relief valve, and may be adapted easily for remote control with manual or automatic pilot control.

EASY FIELD MAINTENANCE

All parts of a Garrett Relief Valve may be inspected or replaced without removing the valve body from the line. Set pressures may be checked and changed with the valve in service.

For the complete story on Garrett Relief Valves – the valves that offer *more user benefits* – write for Bulletin No. RV-103.



Garrett Type "D" Relief Valve. Sizes, 1" through 8", single or dual outlets, for working pressures from 150 to 5000 psi. Supplied with soft or hard seats, screwed or flanged connections.

Garrett Type "E" Relief Valve. Sizes, 1" through 8", for working pressures from 25 to 200 psi. Soft or hard seats, screwed or flanged connections.

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Investors will take hard look at gas industry this year

GAS staff report

INFLATION and tight money are problems haunting money seekers in the natural gas utility and pipeline business. These, coupled with the erratic behavior and recent "leveling-off" trends of the stock market, have caused investors throughout the country to take a serious look at the gas industry equities and debt securities in their portfolios. And, in turn, gas company managements are eyeing market conditions for trends in both senior and junior financing.

Tight money is the product of a period when demand for money is large and the supply is short. The shortness of supply is the result of public savings trailing development of the economy. Savings are the pool that furnish capital formation. But, over the past 30 years or so the level of savings in relation to the size of our economy shows a reduction of about 25 per cent. In 1958, then, the gas industry will be in competition with other industries requiring capital for expansion, etc., in an economy that is larger than ever, but is supported by a relatively reduced level of savings. It adds up to high cost of money.

High cost of money is not new to the gas industry. In the summer of '57, for example, Tennessee Gas Transmission bonds were sold at a 5.25 per cent yield. Michigan Consolidated bonds were marketed at 5 per cent yield. These figures contrast with TGT bonds that were sold in 1955 at 3.80 per cent yield, and Michigan Consolidated debt securities went at 3.35 per cent.

Equity investors too are sharpening their pencils. Obviously, the equity security investor feels the pinch in common stock dividends as the bond yields gain. And they are watching regulation of the gas industry closely. Rate structures pegged at or around the classical 6 per cent rate of return level are not attractive when new-money costs seem to require a rate of return of at least 7 per cent.

However, there are some silver linings behind the dark cloud of tight money—at least as far as the gas industry is concerned. On feeling the pulse of Wall Street, we learn that rates for new money tend to fluctuate to extremes. There is considerable feeling that the high interest rates experienced in 1957 were the upper extreme. Though we hear a lot of talk about bond money costing in the neighborhood of 5.5 per cent, it is more likely to average between 4.5 per cent and 5.0 per cent during 1958. About 4.6 per cent would be a good guess.

The reasons for this predicted trend for 1958 are as follows: First, as previously mentioned, interest rates tend to gravitate to the extremes. We believe the gas industry has been through this extreme, at least for a temporary period. It is pretty obvious that there will be a slight increase in the interest rate between 1957 and 1962. But things-economic are aggravated by psychological factors. And we feel that there is enough negative psychology (without passing judgment on its validity) in the general business climate today to cause some cutback in expansion and other operations that call for new capital generation by other industries and municipal and state bodies. Certainly there has been some leveling-off (or whatever you care to call it) during late 1957 and this should ease some demand for new funds. The Federal treasury, however, will continue to offer generous yields in its refinancing.

$ ... Buyers of common stock from gas company issues seem inclined to purchase in direct relation to growth prospects. The gas industry has much to offer this objective.

Then if there is even a slight dip in interest rates, it is expected that much corporate, municipal and state financing will be held in abeyance. These statements do not exclude from our thinking the possibility of future short-term interest fluctuations that could exceed current levels.

There is hope also from the equity security buyers. Buyers of common stock from gas company issues seem inclined to purchase in direct relation to growth prospects. The gas industry has much to offer this objective. It is very attractive to the investor who maintains the conservative type of portfolio. Or the investor who hedges very speculative purchases with conservative equities generally associated with many of the gas utility and pipeline stocks.

The erratic movement of the stock markets in 1957 will have its

$ . . . Diversification is giving some companies needed shots in the arm for the generation of growth capital.

psychological effect in 1958. Many relatively new investors have never been "in the market" during a period when paper losses were anything but rare. They may be scared out of the more speculative, large capital-gains type issues and into the more steady gas industry offerings. This could be an important financial readjustment for the gas industry in 1958.

Diversification is giving some gas companies needed shots in the arm for the generation of growth capital. This trend will continue in 1958. The purpose of diversification is simply to get into profitable sidelines involving business that does not suffer federal and other regulation. Twin objectives can be realized. Profits may be increased and the non-regulated businesses can often take generous volumes of gas (from the parent's system) during the summer delivery decline. Focal-point of diversification is in exploration and drilling for oil and gas. These are the traditional sidelines of the pipeline companies, but they are being joined in it by some gas distributors. Financially, for 1958, a result will be a gradual increase in cash flow within gas companies.

Cash flow and cash generation within gas distribution and pipeline companies has been historically lower than with companies in other industries. Gas companies internally generate only about one-third of their proposed capital outlay. The other two-thirds comes from sale of debt and equity securities through public offerings and private placements with institutional-type investors — insurance companies, savings banks, pension funds and other trust funds. For 1958, diversification offers at least a start in gradually increasing funds internally generated in, and the cash flow through, gas companies.

Inflation has been with the gas utilities and pipeline companies for some time. It is not new to those that were operating shortly after World War II. They were able to keep up with it pretty well through engineering more efficiency into their systems and through gaining needed rate increases. A big problem during 1958 (as it was in 1957) will be the continuing lag in getting needed rate increases through the various regulatory bodies.

Best estimates indicate that inflation during 1958 will show a 1 per cent growth in price levels. This rate of increase is slightly less than has been the case in the past few years. However, at the same time, we are faced with the psychology of investors that fear inflation and cast a jaundiced eye at portents of deflation which are now showing over the financial horizon. In the long run, gas companies seem well able to live with inflation. It tends to boost a gas company's (particularly a gas utility's) rate base, which could qualify it for rate increases should profits lag. The danger for '58, as mentioned, is that the rate increases seem to do most of the lagging. Some rate increases lag need by years. This is not healthy from an investor's point of view. And the regulatory lag is going to get worse in 1958.

In 1958, the gas industry will again—according to early estimates —spend over $2 million on new construction. The majority of this money will come from outside sources since gas companies produce somewhat limited internal cash generation. The sale of equities might be slower during the year as the stock market reaction during the last quarter of 1957 was not of a character that will produce enthusiastic participation. Most equity securities will be purchased by those wanting to add conservative, growth issues to their portfolios.

Debt securities will be placed with the large life insurance companies and other institutional type buyers. This is the way it has been in the past, of course.

Some 15 of the nation's largest life insurance companies, representing over 70 per cent of total assets of all life insurance companies, hold about $2.8 billion of gas industry debt securities. There are, however, indications that the standard type of bonds are not as readily attractive to institutional investors today as they have been during the past 10 years. Like gasolines, something has to be added to make senior financing more attractive to the discerning investor. A trend in '58 will be toward issuance of bonds and debentures having the convertibility to common stock feature, lower maturities, etc.

$ . . . Lenders in 1958 will want adjustment of the debt amortization period.

A very serious financial trend is the continued decline in gas industry earnings. There are a number of factors involved—all the way from weather to regulatory lag in rate adjustment matters. However, Wall Street personalities tell us it is not all weather that is causing the slippage and investors can be expected to take this trend into consideration during 1958.

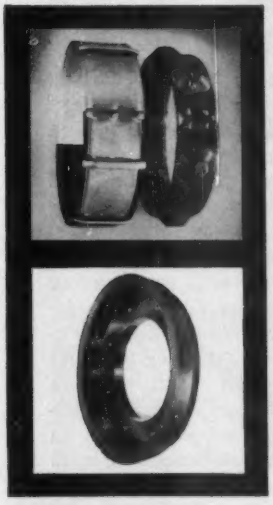
$ . . . Estimates indicate that inflation during 1958 will show a 1 per cent growth in price levels.

The investor circa 1958 will be looking more closely into the detailed operation of gas companies he contemplates supporting with his saved capital. He will be studying the changing relationship of equities and bond yields. Debt ratios will come under his scrutiny and may require alterations. Price-earnings ratios on common stocks are certainly involved, as well as other pressures on the market.

Lenders in 1958 will want adjustment of the debt amortization period to bring it within greater equality to existing, proved gas reserves owned or committed to a particular gas company. They will tend to demand review of the gas reserves picture on a yearly basis.

But, in talking to the people on Wall Street, one gets the impression that the real key to the financing situation is the attitude of the various regulatory bodies. Today, these agencies regulate every segment of our industry, from production to utilization. In the final analysis, the attractiveness of gas company offerings to investors rests in the climates produced by regulatory and legislative bodies. ■

...ALWAYS WITHIN ARMS LENGTH



CROSSING INSULATORS

Truly rugged crossing insulators, the Maloney Models 55 and 57 shown are in addition to the wrap-around Model 56 crossing insulator in the complete line developed in the Maloney Research and Development Laboratory shown above. In crossing insulators, as in other products, Maloney research has set *new* industry standards.

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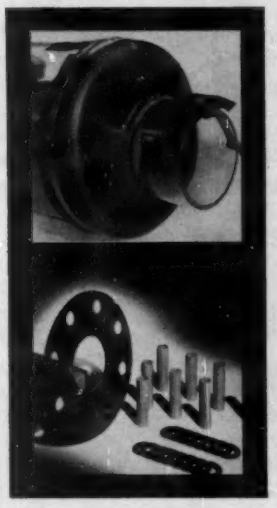
The unique lip design of the Maloney scraper cup insures complete effectiveness throughout the life of the cup. Completely adaptable to out-of-round and other adverse conditions, the Maloney scraper cup *has no equal*. If time is a factor, F. H. Maloney is *'within arm's length.'*



CASING SEALS

This zipper type casing seal is equally suited for new or replacement applications. The zipper joint assures a dust-tight, water-tight seal — installs in minutes. Slip-on types for new applications are also available. *Both* compensate for eccentric installations without any special handling, and are available to *you immediately*.

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Maloney Flange Insulation sets include all components for each joint; central gasket, sleeves, and washers of linen base Bakelite. High pressure applications are available with a Neoprene faced central gasket — *eliminating* any other gasket seal. Another result of *continuous* Maloney research.

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Budding missile age will influence Capital activity

By **NEIL REGEIMBAL**, GAS Washington Bureau

WASHINGTON activity, and the gas industry's relationships with the federal bureaucracy, will be strongly influenced in 1958 by the budding missile age and this country's efforts to repair the holes in our national defense.

One of the most serious and far-reaching effects of the concern over U. S. scientific and technological lag will be a slow but steady increase in government control over all phases of American life—business and personal.

All segments of the gas industry, and business generally, will feel the impact of a resurgence of "emergency fever" in the Nation's Capital. A trend by government to spread its control over production, transportation and use of possible defense materials, including fuels, will begin to build up in 1958.

Russian scientific successes have already rocketed congressional interest out of the usual election-year channels of tax cuts, low budgets, and social legislation. The lawgivers now will concentrate on arguing who's to blame for lags, how big the military budget should become, how and where to spend the money, and where to get the funds to spend.

Other types of legislation will tend to take a back seat to military problems.

Here's a rundown on what to expect from Washington in 1958:

The Harris-O'Hara natural gas bill is in an extremely vulnerable position. It's on the House agenda, and can be brought up at any time. But it is still being attacked as a "consumer gouge" measure, and thus still carries a political taint in an election year. It still has only half-hearted support by many gas producers and distributors.

If the so-called coal amendment (giving the Federal Power Commission power to regulate direct industrial sales and forbid "below cost" sales) is traded into it, the bill will lose much of the support it now has. It's been around a long time, and is a tired subject when compared with the dramatic interest of missiles and space satellites.

The bill's fate may rest on the success of backers in working out a compromise with the coal groups, particularly the unions, to bring in some fresh support without driving present backers away.

Summing up, the outlook for passage is no better than 50-50, at best.

Concerted attacks on the 27½ per cent tax depletion now permitted gas and oil production will appear in January just as the congressional session opens. Some of the attackers will be demanding higher depletion rates for their own products in the same breath in which they blast the gas and oil rate. Chief among these will be the coal producers, who want to hike their rate from the present 10 per cent to about 22½ per cent to improve their competitive position as a fuel.

When the gas-coal vote trading gets down to the final stage, depletion may be included in a package compromise—the gas interests to support a higher coal depletion rate, in exchange for gas bill passage with the coal amendment in some form and no tampering with the gas and oil depletion rate.

If compromise efforts fail, the gas industry may face defeat of the gas bill and an explosive attack on the application of the depletion rate for so-called extraneous drilling expenses, which some opponents charge gives the producers "tremendous tax gifts" from the government for non-producing costs.

The outlook is still for no reduction in the depletion rate for domestic gas and oil, a prohibition on its application to foreign produc-

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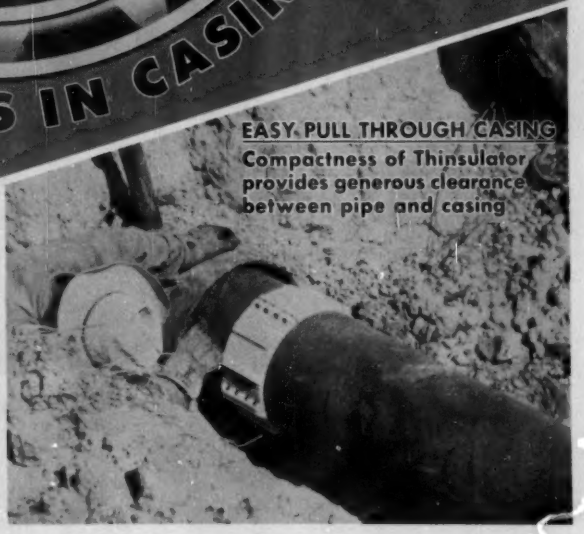

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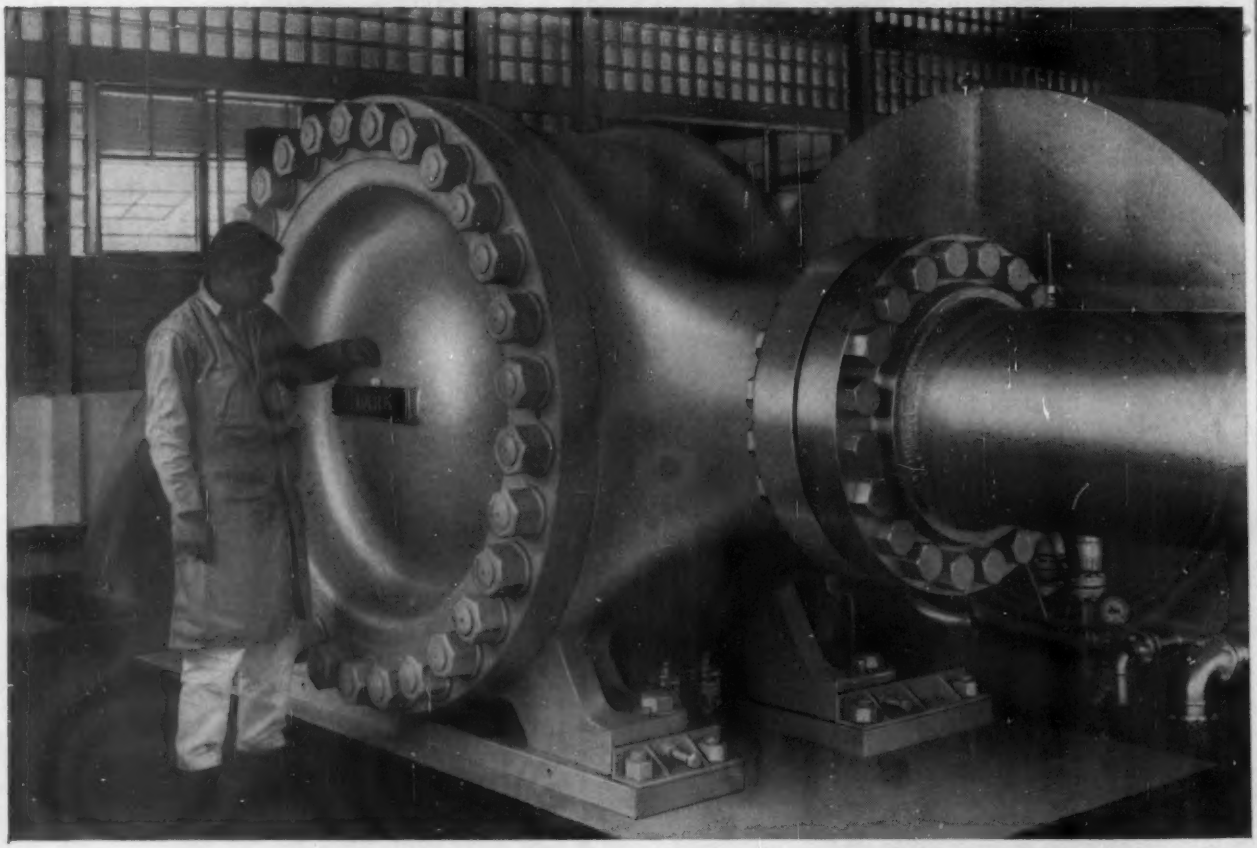

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Clark centrifugal pipeline compressors, designed specifically to meet gas transmission requirements, are built to meet the future.

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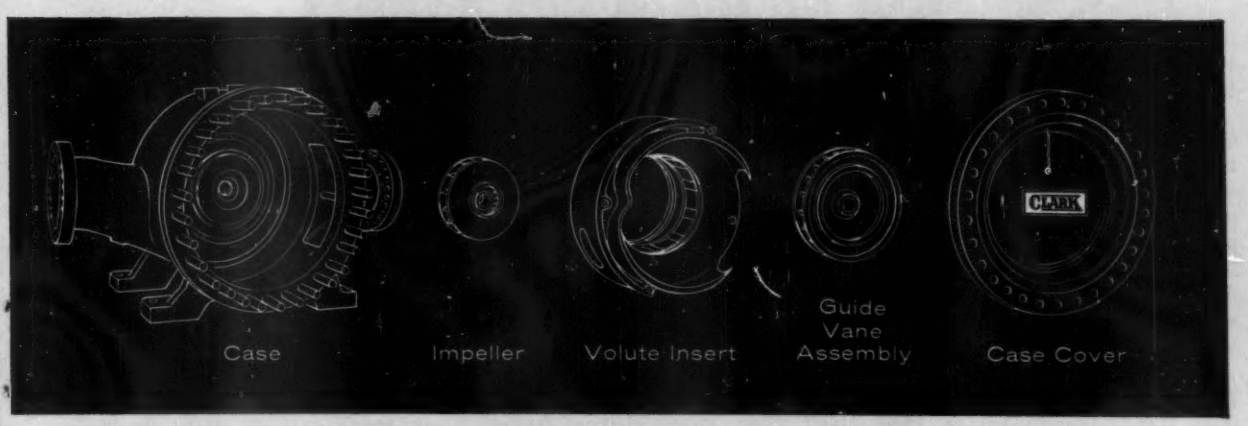

Complete internal assembly is easily interchanged to meet future conditions.

tion and some fringe costs and possibly a slight increase for coal and some other depressed mining operations.

Tax cuts, in light of the burgeoning military spending outlook, stand almost no chance of passing in 1958, or in any year soon. Federal spending this year will total about $72.5 billion, with income about $1 billion higher. Next year, spending will tend to rise a little, but income will remain about the same, so the $3 to $6 billion needed for a tax cut just won't be in the government's pocket. There's a chance the lawmakers will approve some scheme to give a special tax break to the small firms, but any revenue loss will have to be made up.

The utility relocation provision of the federal highway program, which permits states to use federal funds to help pay the cost of relocating pipelines and wires as roads are rebuilt, will come under strong attack this year. Highway officials are finding the road building program far more expensive than first planned, and knocking out this provision would help provide more funds for actual construction, they say. This alleged "subsidy" and "raid on the highway fund" may be killed in 1958.

On the labor and antitrust fronts, Congress is likely to pass some new "tightening up" legislation. Sensational Senate Rackets Committee disclosures in recent months increase the chance of legislation to control union health and welfare funds, set up federal laws governing union elections, and tighten up rules governing collective bargaining practice.

At the same time, an Administration-backed bill requiring firms to give the federal government at least 60 days advance notice before merging will probably also be passed.

A once popular movement to tighten up laws governing lobbyists now seems to have little active backing, and may gather dust.

The gas industry's reputation in Washington, although improved from the low point hit in 1956 when the president vetoed a gas bill because of "arrogant lobbying," is still anything but pure white.

Principal thorns in the industry's public relations now are antitrust suits. One suit is on file against El Paso Natural Gas Co., for its acquisition of Pacific Northwest Pipeline Corp. William P. Rogers, the new attorney general, was only in office a few weeks before he opened a federal grand jury investigation at Milwaukee into alleged restraints of trade in production, distribution and sales of natural gas in the upper Midwest, primarily in Wisconsin and Minnesota. Target of this probe are Peoples Gas Light and Coke Co. (Chicago); Northern Natural Gas Co. (Omaha), and the American Natural Gas Co. (Detroit).

In addition, the trustbusters are eyeing Pacific Gas & Electric Co.'s bid for a $9.3 million increase in gas prices in northern California, a firm supplied by El Paso. Several grand juries are also probing antitrust charges against oil pipelines and the oil business generally.

The speeded-up program of research and technological development will bring in 1958 a powerful demand for a new and vastly-expanded government program to develop atomic power. Critics of the government's present policy of encouraging private industry to develop economically competitive atomic electric power will use the Sputniks to try to bludgeon a multi - million - dollar program through Congress. This will be a close race, with the private develment group having only a slim edge.

The economic health of the country will be another major battle for Washington in 1958. The government money managers, in a crisis atmosphere, will have to try to keep the country spinning at a high level to provide the economic strength and the tax revenues to underpin the military programs.

As a result, the tight money policies of the past two years will continue to be eased, slowly, to prevent any serious dip in industrial activity. Financing of all kinds will become gradually easier as the prime interest rate, bond rates, and other interest charges decline.

Homebuilding is expected to pick up early this spring, with the resultant increase in sales of appliances and other materials—a welcome note for gas distributors. Conservative government estimates are that some 1,040,000 new homes will be started in 1958, up from about 970,000 in 1957. With money easing, this estimate may easily be exceeded by several hundred thousand.

Costs, however, will continue high. New homes will cost about 3 per cent more. Equipment and materials of all types, particularly those made of metals, will average a little higher than in 1957. This unusual inflation in the face of slipping production, caused largely by rising wage rates, will probably continue for some time.

At the Federal Power Commission, 1958 will probably see a decision in the two-year battle over efforts of the Midwestern-Tennessee Gas Transmission group to import Canadian gas. The outcome will depend largely on developments over the next few months in a Canadian study of what its export policies should be, and whether it will honor earlier commitments to approve export for the Midwestern-TGT project if the FPC approves it.

Betting in Washington is still on approval of the project, but the odds have slipped since the first hint of resistance by the present Canadian government to gas and oil exports.

The Federal Communications Commission is also expected before the first of 1959 to complete its reappraisal of allocation policies for the microwave frequencies (890 mc and above), and possibly have a good start in a companion review of lower frequency allocation policies.

FCC observers don't expect any radical changes in policy. Present users will continue to get needed space, without compulsory sharing, but tighter restrictions may be placed on the use to which they can place their licensed facilities. The common carriers in microwave will probably get additional allocations for expansion. Most of the marginal users, such as department stores and industrial plants, will get space only in cases deemed unusual by the commission.

Washington in 1958 thus will be a year of decision on both national and business fronts. ■

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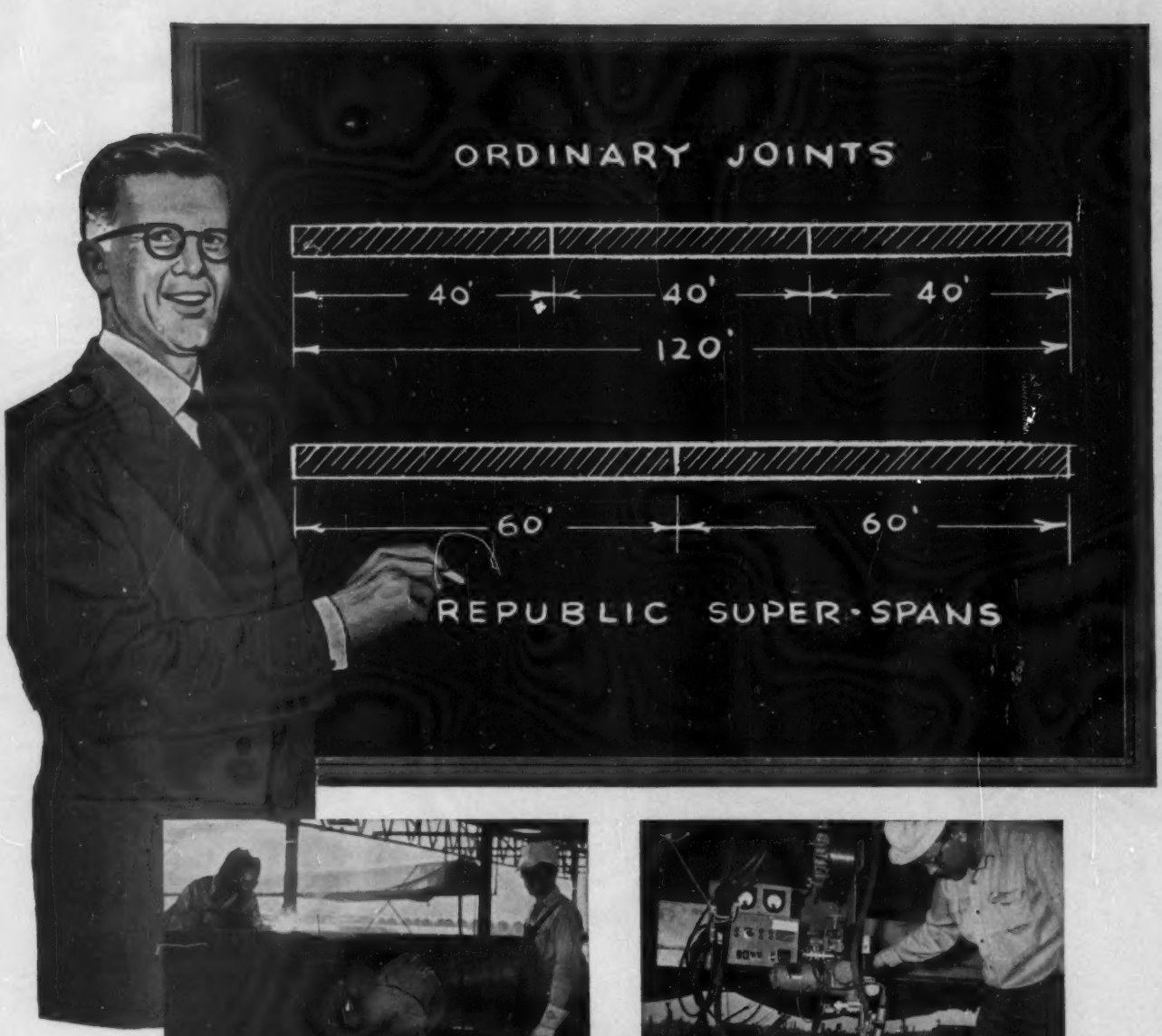

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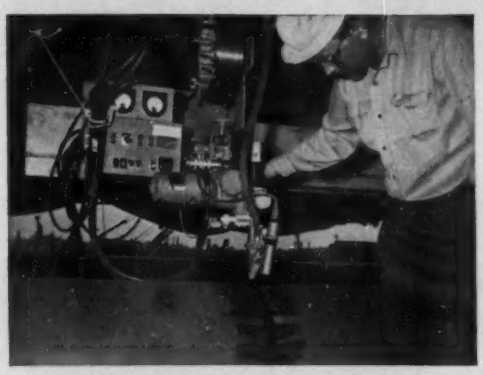

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Beyond savings in time and money, Republic's exclusive "SUPER-SPAN" Fusion Weld Line Pipe Joints provide end-to-end uniformity to assure interruption-free laying. Over the years, Republic's 30-foot joints have built an enviable reputation for consistent diameter and wall thickness. Laying crews can line up joints fast and accurately—complete field welds with maximum speed, unhampered by costly burn-throughs due to thin spots. Further, uniform high ductility and yield strength of Republic Fusion Weld facilitates field bending and provides unexcelled dependability in high-pressure service.

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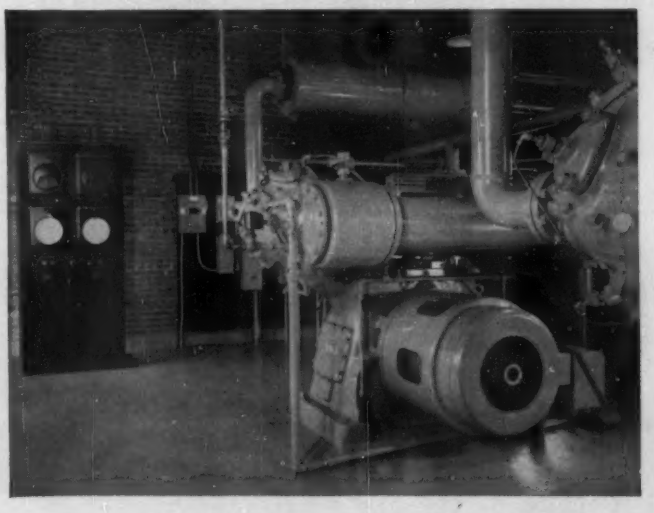
Using Teletax Telemetering, the supervisor at Springfield Gas Light Co.'s main plant (above) controls desired, air/gas ratio at compressor station (below) three miles distant. The company purchases gas from the Tennessee Gas Transmission Company line, stabilizes it to maintain a constant B.T.U. value.



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By FRANK CHAPMAN

IRE group discusses frequency allocation

THE serious crowding of mobile radio frequencies was discussed at the eighth national conference of the professional group on vehicular communications of the Institute of Radio Engineers in Washington on Dec. 4-5.

Speaking in general on the overcrowded mobile band conditions, Mason Collett of Atlantic Refining Co. and chairman of the API central committee on radio activities said: "Today most of the private radio users recognize the fact that the presently available frequencies can continue to service us well only if every possible regulatory and technical effort is made to improve the efficiency of our use of the radio spectrum.

"To this end, the petroleum users helped pioneer the testing of split channel equipment in the 40-50-mc bands, and made the first formal application to the FCC for its use. We have, only a month ago, cooperated with the Forest Industries group on the first application of the principle of geographic sharing among user groups. We fully expect that this principle will be expanded in the future, especially in the metropolitan areas where the few hundred presently available channels are approaching saturation at the most rapid rate."

In speaking of the future, Mr. Collett said, "We would be emphatic in our demand that a minimum block of frequencies be reserved on a nationwide basis for future essential users in each user group wherever these users might appear. No one can predict, for example, where a pipeline may be built, or where some industrial development may require radio for police and fire protection in some new community. The first steps toward geographic sharing will probably evolve into a scheme whereby all unused frequencies in any given area which are not reserved for users on a nationwide basis, will be thrown into a pool to serve all eligible radio users on a first come-first served basis. Eligibiiity in any such pool or 'broad band' system could never be determined with complete fairness and with adequate priority to essential users. It seems obvious to us that those users whose services are most essential to the public safety and necessity should have priority over those essential only to the public convenience; but who is to make this determination? It is not easy to deny the use of radio to any business or industry which can use it to make a profit or to reduce the cost of their services to the public. This principle has already been established in the use of the citizens band.

"There exists a most definite need to provide a few relatively narrow band, point-to-point channels in or near the 450-mc band (for economical point-to-point service, utilizing the multi-channel equipment now appearing on the market, for remote and offshore areas). These would replace the 72-76-mc frequencies which have become almost worthless since the TV interference restrictions were placed upon them.

"All informed private users of radio must recognize that in perhaps five to 10 years, at the present rate of expansion, the presently available vehicular communications spectrum will be completely saturated in some areas despite all improvements in regulation and equipment. When this day comes, the pressure for new spectrum space will be irresistible.

"It is, of course, easy to point a finger at any little-used part of the spectrum and say 'take part of that.' For example, it is hard for our people to understand why the safety and special services must be so crowded when the UHF TV band is virtually unused. It is wise to reserve some frequencies above 890 mc for urban vehicular use, but it would seem that the UHF bands should be fully utilized before the mobile services are forced to move to microwave bands.

"Then, too, we wonder if it isn't time to take another look at the lower frequencies, even at those below 25 mc. Recently, for example, we heard of an American-made, single-sideband, mobile unit operating with 30 watts in the 7-mc band talking a distance of approximately 300 miles in Venezuela. Such long range vehicular communications would be of obvious value in the remote and offshore areas."

Speaking at the same meeting, D. E. Noble, executive vice president of Motorola said a spectrum study of both government and non-government frequency usage is "overdue," and such a study should be instituted, under congressional sponsorship, to develop both intermediate and long range plans for frequency allocations. It is perfectly obvious, he said, that "broadcast is not using all its channels," and that any frequencies not being used should be re-allocated if there is a need from other areas for frequency space. This came in answer to a question as to what "designs" the land mobile radio users have on broadcast frequencies, particularly FM and UHF TV bands. Mr. Noble said present allocation patterns are "obsolete"; that present dual authority over the spectrum by the FCC and the Interdepartmental Radio Advisory Committee are "not intelligent," and that a new study is needed. ■

GAS pipeline news

Crown Corp. lets contract for 367-mile stretch

Northern Ontario Pipe Line Crown Corp. has let contracts covering the 367-mile Port Arthur to Kapuskasing, Ont., stretch of the Trans-Canada pipeline.

The contracts, divided into five spreads of varying lengths, involve a total estimated expenditure of $20.8 million. The work is to be completed in the 1958 construction season.

Contractors and the estimated amounts of the contracts are: Nelen Ltd. & Associates, $4 million; Morrison-Shivers Ltd., $4 million; Majestic Contractors Ltd., $3.8 million; River Construction Corp., $4.8 million; Mannix Co., $4 million.

Texas high court upholds ratable decision

The Texas supreme court has upheld the first order issued by the Texas Railroad Commission declaring a gas pipeline to be a common purchaser in a field and requiring it to take ratably from all producers.

By refusing to grant a writ of error in the case involving the Puckett field in Pecos county, the court sustained the validity of Texas conservation laws.

Involved were two companion cases arising from the commission's order requiring Permian Basin Pipe Line Co. to take gas ratably in the Puckett field and to give all producers equal access to its processing plant. Permian was buying from Phillips Petroleum by contract and processing the gas in a plant at the field site. Atlantic Refining acquired a well in the field and contended that, as a common purchaser, Permian must make plant facilities available and buy from Atlantic on a ratable basis.

The commission's order to this effect was contested on the grounds that the plant was not a public utility. The appeals court upheld the railroad commission and the supreme court refused to review that decision.

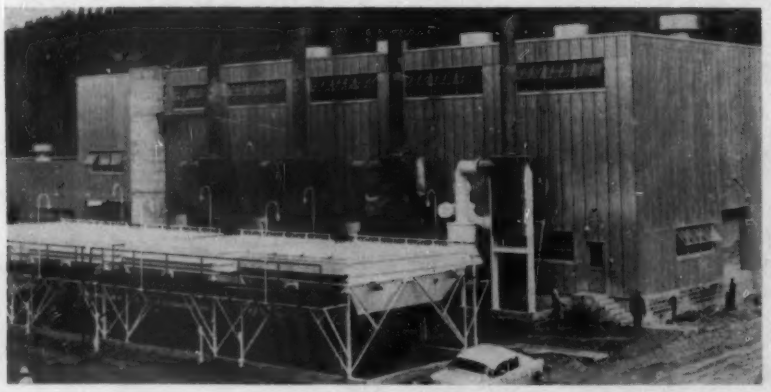
Transco plans major system expansion

When approval is received, Transcontinental Gas Pipe Line Corp. will add 180 MMcf/day in service to existing customers. The general expansion of its system will cost Transco an estimated $126.8 million.

The company seeks FPC authority to construct 13 different 36-in. pipeline additions totaling 201.94 miles and 106.13 miles of 30-in. line in five different projects. In addition, permission is sought to construct three new compressor stations with 24,080 hp, and to add 2500 hp to five existing stations.

A total of $23.8 would be spent for storage facilities and $20.8 million for extension of gathering facilities, mostly in Louisiana.

Huge cooling units like these are being used by Westcoast Transmission Co. along its line transporting gas from Peace river fields in British Columbia and Alberta to markets in Canada and the U.S. Pacific Northwest. The Fluid Coolers are air-cooled heat exchangers made by Trane Co., La Crosse, Wis., and Trane Co. of Canada Ltd. Installation of the coolers, 20 ordered to date, will be in four British Columbia compressor stations located near Taylor Flats, Fort McLeod, Australian and Savona.



43- and 55-in. pipe planned for gas line

What may be the largest gas pipelines ever built have been contracted for by Williams Brothers Co., Tulsa.

The dual lines, to be constructed for Carnegie Natural Gas Co., a U. S. Steel subsidiary, will provide coke-oven gas to six plants in the Pittsburgh area.

The two lines will have a diameter of 55⅜ in. for the first 8.5 miles of their 13-mile length, and 43¼ in. for the remainder. Pipe laying is expected to start in May.

Although pipe up to 80 in. has been used by the Army for water lines, it is not believed that pipe of the size to be used on the Carnegie project has ever been used for gas transmission.

U. S. Steel's American Bridge division is making new rolls to fabricate the pipe. Special hydraulic line-up clamps have been developed for use in construction.

The lines will transmit 255 MMcf/day at 15 psig. The low pressure system was used in place of high pressure smaller pipe because of the treating facilities which would be required to clean the gas before compression.

TGT gets partial okay for $129 million job

Tennessee Gas Transmission Co. has FPC approval of a $129.5 million expansion project, providing TGT shows that the facilities will be used solely to meet present commitments to its existing customers. The authorization provides that the new facilities will in no way be related to the service TGT proposes to render to Midwestern Gas Transmission Co.

Included in the authorization is about 897 miles of line and 66,990 hp in compressor capacity. Of the total, 556 miles of 30-in. line will run from the Louisiana Delta to Portland, Tenn. The remaining 341 miles of 24-, 26-, and 30-in. line will parallel TGT's existing system.

The new facilities are part of a project proposed by TGT in an application on which proceedings have not yet been completed. This

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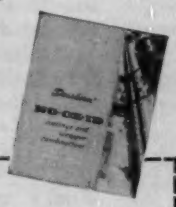

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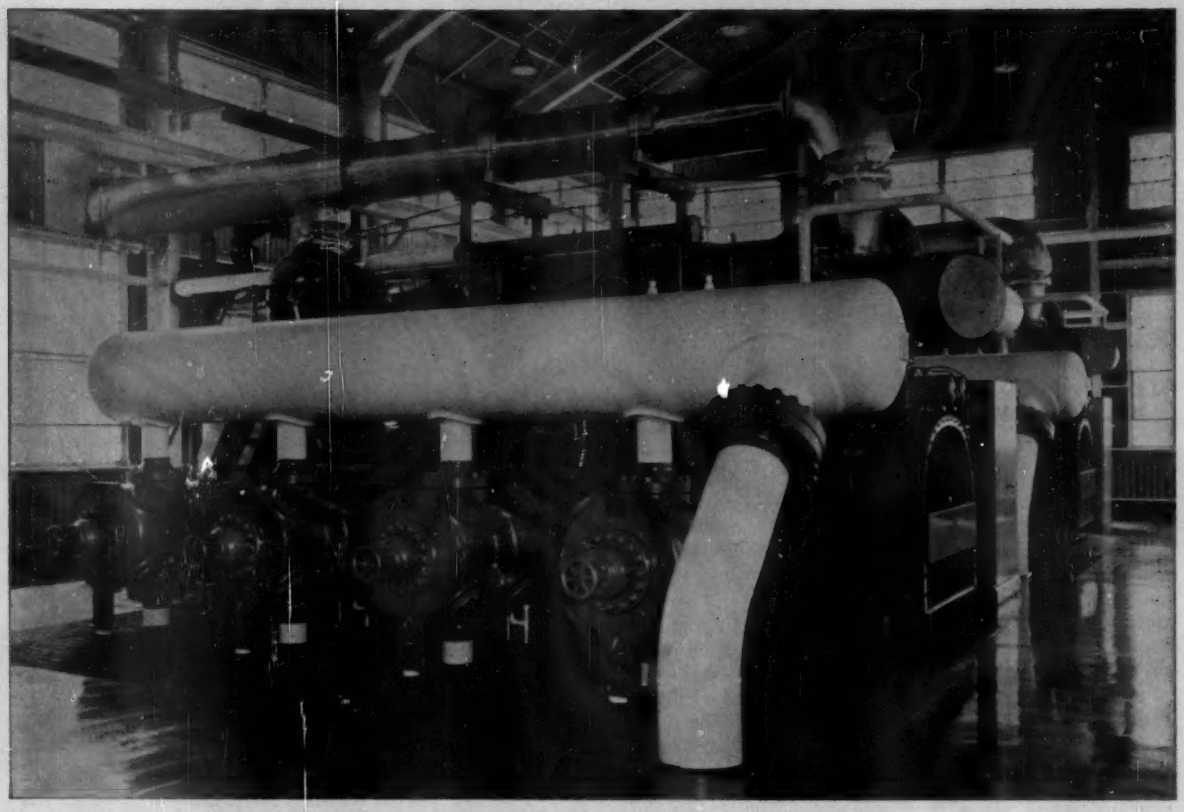

At Shelbyville, Indiana

American Louisiana installs 10,000 hp of KVS turbocharged gas-engine compressors

At Shelbyville, Indiana, in one of the three primary stations of American Louisiana Pipe Line Company, the efficiency of Ingersoll-Rand compressors and the flexibility of 4-cycle power are being applied to the task of supplying gas to utilities in Michigan, Wisconsin, Iowa and Missouri.

All of the five gas compressors at the Shelbyville station are 2000-hp Ingersoll-Rand KVS turbocharged gas-engine units. These are basically the same machines which have been setting new records since the first KVS was installed early in 1952, but incorporating the improvements which have resulted from years of tough service.

Incidentally, the first KVS (and the world's first turbocharged engine-compressor) was installed for an American Louisiana affiliate. With the forthcoming installation of six units at its new Defiance (Ohio) station, American Louisiana and affiliates will be operating 23 KVS compressors totalling 44,000 hp.

In addition to heavy-duty compressors, Ingersoll-Rand equipment for pipeline services includes rugged 4-cycle V-angle engine-generating units, centrifugal pumps, starting-air compressors, air and electric Impactools, and many other products. Ask your I-R representative how I-R can help you on your job.

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application is one of 20 by nine pipeline companies, including Midwestern, on which consolidated hearings are still in progress.

Gulf Interstate's system expansion approved

Gulf Interstate Gas Co.'s plan to increase its system capacity to 575 MMcf/day has been okayed by the FPC.

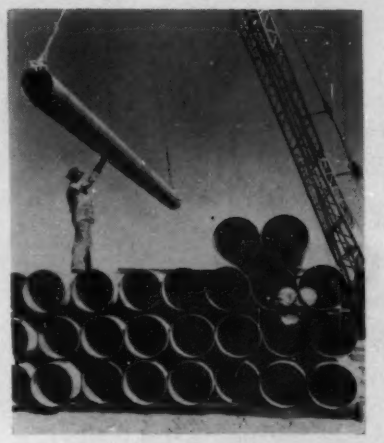
New facilities, estimated to cost $25.6 million, will be built in Kentucky, Tennessee, Mississippi and Louisiana to move 127 additional MMcf for United Fuel Gas Co. At the same time the FPC issued certificates to five independent producers to sell to United Fuel the additional gas which will be transported by Gulf Interstate.

Gulf Interstate will install 69,000 hp in 10 mainline compressor stations; a 550-hp compressor station in Cameron parish, La.; and about 10.2 miles of 12-in. loop supply line in Vermilion parish, La.

New pipe plant serves eastern, southern areas

Serving the eastern and southern industrial areas is Pipe Line Service Corp.'s new Sparrows Point (Md.) plant.

With 108,000 sq ft under roof, the new plant has six fully equipped production lines for coating and wrapping pipe ranging in diameter from ¾-in. to 30-in. Coating and wrapping lines are equipped with gas-fired, pre-heat ovens to dry pipe and bring it to suitable temperature for the cleaning and coating processes.



Steel pipe is stored outside Pipe Line Service Corp's new plant and is moved by crane to gravity racks that lead into the plant.

Steel shot cleaning equipment is used to insure a thorough job of removing rust, mill scale and impurities from the pipe surface before the prime coat is applied. All operations, from bare pipe to loading the electrically inspected coated pipe to specially prepared rail cars, are completely under cover.

Producers sold pipelines 6 trillion cu ft in '56

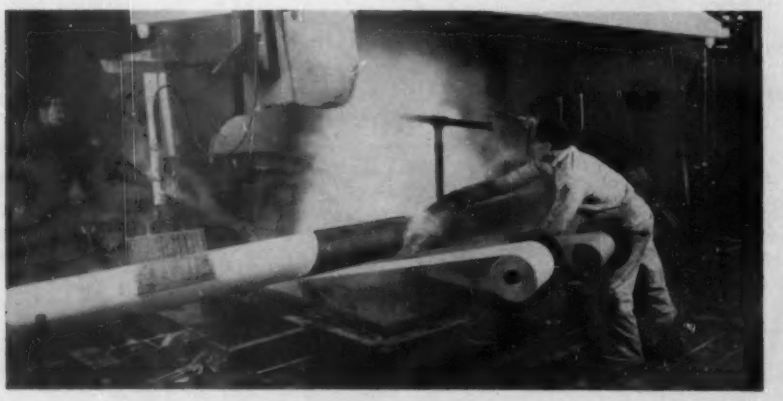
In 1956, independent producers sold directly to interstate pipeline companies more than 6.1 trillion cu ft of gas at a cost of $698,470,623, an FPC staff report shows. This averages out at 11.3 cents/Mcf.

Actual purchases by pipelines during 1956 totaled 6,163,442,922,000 cu ft, compared with 5,526,917,000,000 cu ft in 1955. Revenues in 1955 were $589,561,000, for a 10.6 cents/Mcf average.

The direct purchases during 1956 were made from 4948 producers in 21 states. Twenty-eight of the producers supplied approximately 60 per cent of the gas purchased, while 130 (3 per cent) supplied more than 85 per cent.

Of the total purchases made by pipelines in 1956, approximately 92.5 per cent of the gas came from producers in five southwestern states, as follows: Texas, 50.4 per cent; Louisiana, 23.5; Kansas, 7.1; New Mexico, 6.4; and Oklahoma, 5.1. A total of $324,542,562 of the total revenues (46.4 per cent) was paid to producers in Texas, at an average price of 10.4 cents/Mcf.

In addition to the gas purchased from producers, interstate pipelines produced 806,675,414,000 cu ft, purchased 10,890,093,000 cu ft of manufactured or liquefied petroleum gas, and reported receipts in excess of deliveries for various accounts of 16,353,850,000 cu ft. Thus, the FPC report says, the interstate pipelines rendered services involved 6,986,472,186,000 cu ft of natural gas and 10,890,093,000 cu ft of other gas produced in 1956.



Primed pipe is spirally propelled through coating and wrapping machines by positive drive heads when hot coatings, wrappers, and kraft paper are simultaneously applied.

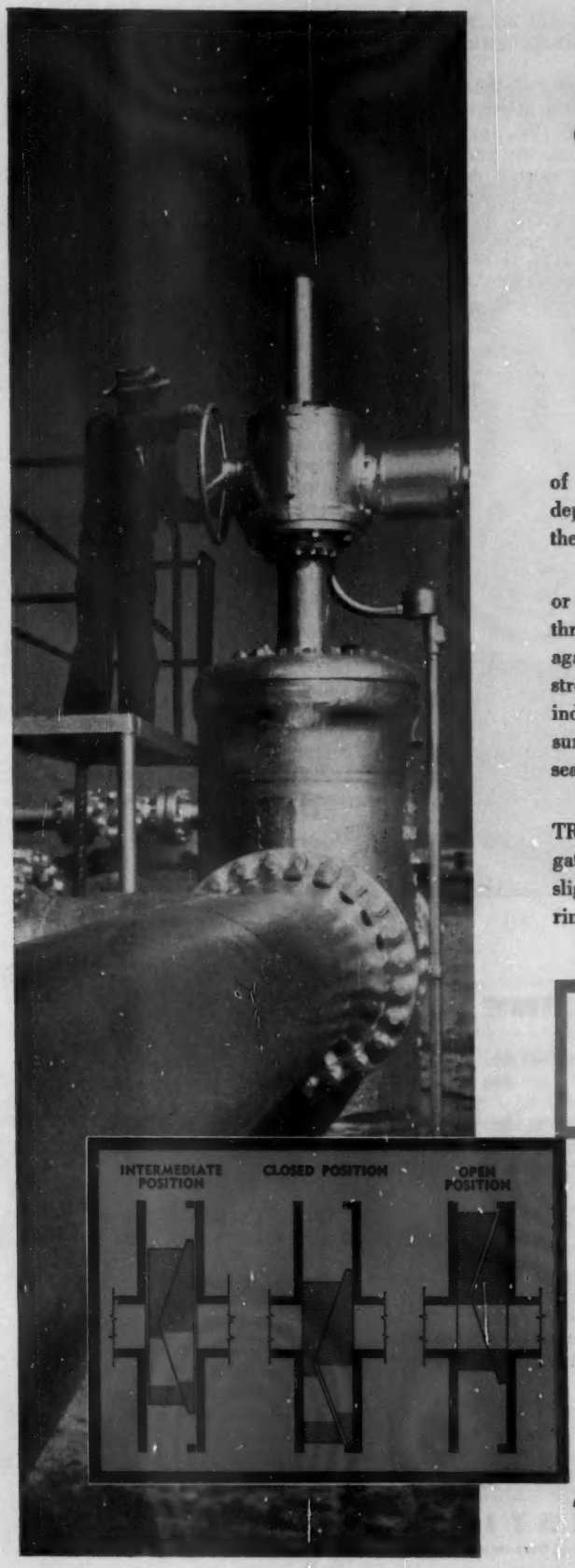
GAS pipeline notes

Permian Basin Pipeline Co., Omaha, seeks FPC approval for 26.8 miles of 10-in. lateral line in Pecos county, Texas. The $787,100 project will enable the company to purchase and receive residue gas from three independent producers.

Dillon, Read & Co., Inc., heads an investment banking group offering 100,000 shares of Texas Eastern Transmission Corp. preferred stock, 6.70 per cent series, par value $100, at $100 a share. Net proceeds from the sale are to be used by Texas Eastern in connection with presently authorized construction.

Lone Star Producing Co. has consummated a 20-year contract for sale to United Gas Pipe Line Co. of its recently discovered gas reserves in the Fashing field in Atascosa county, Texas. Anticipated daily average delivery is expected to be in the range of from 50 to 65 MMcf of gathered, sweetened and dehydrated gas.

Expected to be completed by the end of 1957 was Motorola's new Dallas administrative headquarters. The 12,000-sq ft building will



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house a two-way radio sales office, an expanded parts depot, and a microwave and industrial control sales office as well as the administrative office of the 10-state southern area.

Recently authorized by the FPC were:

Permian Basin Pipeline Co.'s plan for 26.7 miles of 10-in. line and measuring facilities in Crane and Pecos counties, Texas. The Omaha-based company will use the facilities to transport residue gas purchased from two gasoline plants in the area. About 3.7 MMcf per day will be available initially.

Equitable Gas Co.'s plan to develop the Rhodes storage pool in Lewis county, W. Va., for approximately $2 million. At present, the Rhodes pool is nearly exhausted, consisting geologically of three separate pools. The Pittsburgh-based company plans to inject about 1.1 billion cu ft of gas into one of the pools during 1957 and to develop the two remaining storage areas upon completion of the first area.

Atlantic Seaboard Corp.'s proposed installation of two gas engine-driven compressor units at its Boldman compressor station in Floyd county, Ky.

El Paso Natural Gas Co.'s $992,000 construction job in Howard and Borden counties, Texas. El Paso will build about 18 miles of 12¾-in. loops, add 810 hp to its Vealmoor station, add 19 MMcf/day dehydration capacity to Vealmoor, and build additional purchase meter facilities.

New York State Natural Gas Corp.'s installation of a new 3000-hp compressor station on its system near Utica, N. Y., and 9 miles of 12-in. branch line. The project, estimated to cost $1.2 million, will enable New York State to make increased deliveries to Niagara Mohawk Power Corp. for distribution in the Syracuse-Oneida-Rome-Utica area.

El Paso Natural Gas Co.'s $5 million plan covering a series of small installations to attach new gas supplies in Texas, New Mexico and Arizona. No expansion of the company's overall facilities is involved. El Paso said its application was of the budget-type, consistent with a previous policy declaration of the commission designed to eliminate numerous small filings during 1957.

Manufacturers Light & Heat Co.'s proposal to construct and operate new gas facilities in Ohio and West Virginia at an estimated $757,300. Manufacturers said the Ohio construction was necessary because of pending highway and dam construction. West Virginia's construction was required to enable the company to provide adequate service during the 1957-58 winter.

Texas Eastern Transmission Corp.'s plans to build 96 miles of loop, 9 miles of supply laterals and 43,610 hp of additional compressor capacity in new and existing stations. Its subsidiary, Texas Eastern Penn-Jersey Transmission Corp., was authorized to add 24,000 hp to existing stations at an estimated $4.4 million. At the same time Algonquin Gas Transmission Co. was authorized to sell 6260 Mcf of winter peaking gas per day to nine existing customers. This gas will be purchased from Texas Eastern.

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fully for the limited supply of money, the utilities had to issue securities with unusually high yields. In addition some borrowers were forced to include in their securities special features, such as providing for non-callable bonds or high redemption prices for a period of years. The high cost of money, with minor reductions periodically, is expected to continue in 1958. Since the cost of bond and stock capital is a guide used by commissions in selecting a fair rate of return for utilities, the allowed rates of return should also rise in the future.

A Connecticut court rendered a landmark decision in a stock issue case. The utility sought authority for the issuance of capital stock at a subscription price of $30 to existing stockholders. The proceeds were to be used to pay a loan and to finance construction. The commission thought the price of $30 a share was too low, because the current market price was about $40. The commission said that "If the company were permitted to market shares at a price lower than the minimum needed to attract additional capital, the ratepayers might be called upon to pay rates yielding a higher rate of return than otherwise necessary." If the same amount of capital could be obtained from the sale of a smaller number of shares, then less money would be needed to service the stock and the demand on ratepayers would be reduced. The commission concluded that a price lower than $32 a share was not necessary to enable the company to maintain its financial integrity and to attract the required new equity capital. On appeal the superior court ruled that the commission did not have power to prescribe a price for the sale of the utility's stock. It is refreshing to have courts remind commissions that conducting the business of a utility is the primary responsibility of management. ■

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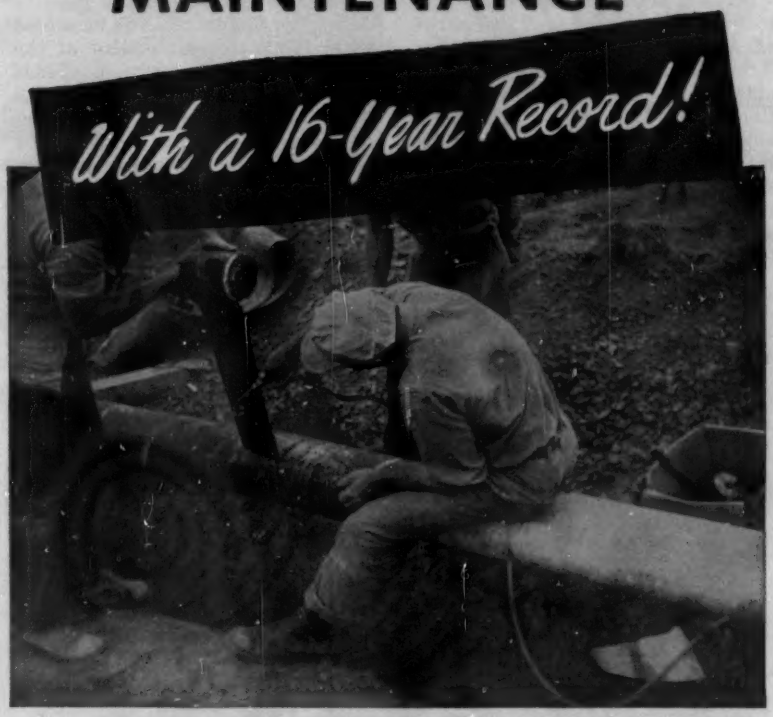

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GAS pipeline people

H. DIX FOWLER has been promoted to vice president in charge of engineering and operations of Trans-Canada Pipe Lines Ltd., Toronto. Mr. Fowler joined Trans-Canada in 1954 as a supervising engineer and was appointed assistant chief engineer in 1956. He was resident engineer on compressor station construction for Gulf Interstate Gas Co. before joining Trans-Canada.

AARON GRIFFITH is now assistant superintendent of dispatching for Texas Gas Transmission Corp., Owensboro, Ky. Mr. Griffith joined Texas Gas in 1949 in the pipeline department. Most recently he served as assistant superintendent of the Kentucky-Indiana division. Texas Gas also has promoted W. S. GODWIN to superintendent of the Tennessee-Mississippi division in Memphis. Mr. Godwin has been manager of the company's Clarksdale, Miss., compressor station for the last seven years. He succeeds T. L. MCWILLIAMS, who recently was named assistant superintendent of the entire compressor department.

H. H. McCamish
Mountain Fuel

H. Dix Fowler
Trans-Canada

H. M. MCCAMISH has joined Mountain Fuel Supply Co., Salt Lake City, as manager of the pipeline division. He will headquarter in Rock Springs, Wyo. Mr. McCamish recently returned from Pakistan, where he was chief engineer (development) for the Sui Gas Co. Before that he was associated with Coast Counties Gas Co.

EDMOND V. BOND, JR., has joined Trunkline Gas Co., Houston, in the newly created post of superintendent of production operations. Mr. Bond assumes a post created by Trunkline's recent entry into the field of gas and oil exploration.

R. L. MORTON has retired as vice president and director of Cities Service Gas Co., Oklahoma City, after 37 years of service. He began his career with Cities Service by becoming assistant to the vice president and treasurer of the Empire Companies in 1920. In 1941 Mr. Morton became vice president of Cities Service Oil Co. (Delaware). Three years later he became vice president and treasurer of the Oklahoma City company.

W. E. WALTON has been named industrial engineer of Kaiser Steel Corp's Montebello (Calif.) fabricating division. Previously he was superintendent of the underframe department and assistant plant superintendent.

J. W. FERGUSON has been promoted to director of natural gasoline and gas operations for Continental Oil Co., Houston.

ADRIAN R. FISHER has become chief executive officer of Johns-Manville Corp. in a realignment of executive responsibilities following retirement of LESLIE M. CASSIDY, chairman. Mr. Fisher continues as president and director, offices which

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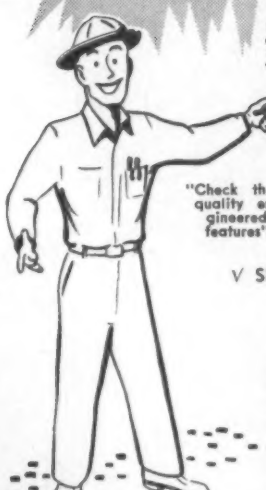

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Texas Gas

he has held since 1951. Mr. Cassidy continues as a Johns-Manville director and will be available as a consultant. The newly created post of executive vice president is being filled by CLINTON B. BURNETT, who also becomes a director.

GAYLE E. STAHL has been appointed manager of gas supply for Pioneer Natural Gas Co., Amarillo. Prior to joining Pioneer, Mr. Stahl was manager of gas purchases for Northern Natural Gas Co. and Permian Basin Pipeline Co.

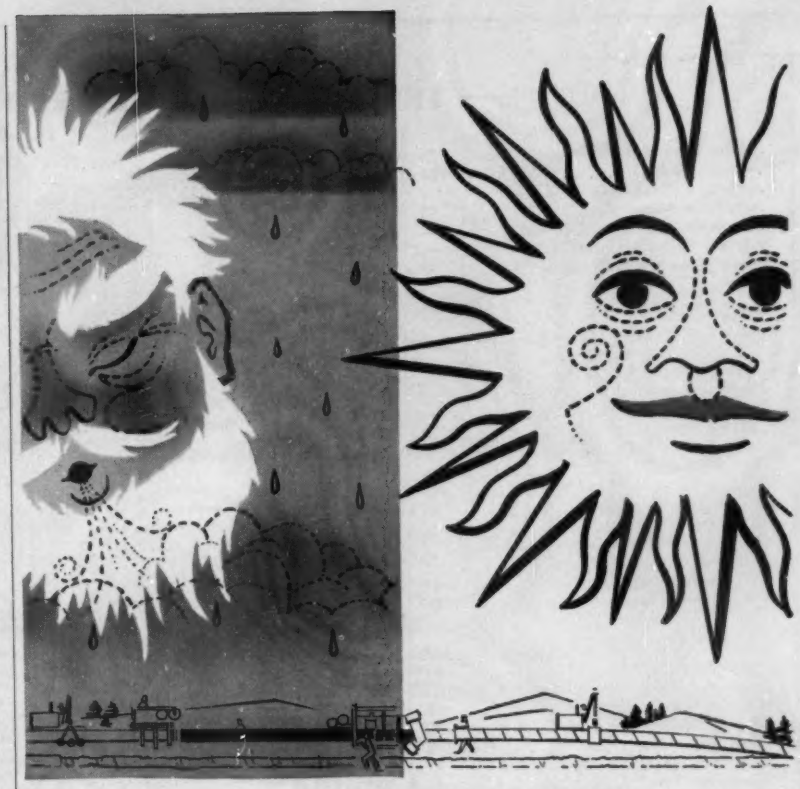
KARL W. MATTHES is now divisional staff engineer for Kaiser Steel Corp.'s general planning division.

JOHN JENSON CASS has been appointed district gas superintendent for the Saskatoon area by the Saskatchewan Power Corp. He will supervise operations in the area bounded by Delisle, Asquith, Vanscoy, Humboldt and Laura from his headquarters in Saskatoon, Sask.

F. CLARENCE MANNING has been appointed a director of Canadian Western Natural Gas Co. Ltd., Calgary. The prominent industrialist is president of Manning-Egleston Lumber Co. Ltd.

LOUIS S. KOTULA has been appointed a sales engineer for the Chicago office of B-I-F Industries Inc., Providence, R. I.

Two district managers have been appointed by the ElectroData division of Burroughs Corp., Pasadena, Calif. W. H. STEWART, who has been a sales representative in the Seattle district, is now Seattle district manager. E. M. OFFINGER, formerly sales representative in the Washington district, is now manager of the Detroit district. ElectroData has also announced the appointment of ROBERT V. AIRHART as field engineering supervisor in the San Francisco district.



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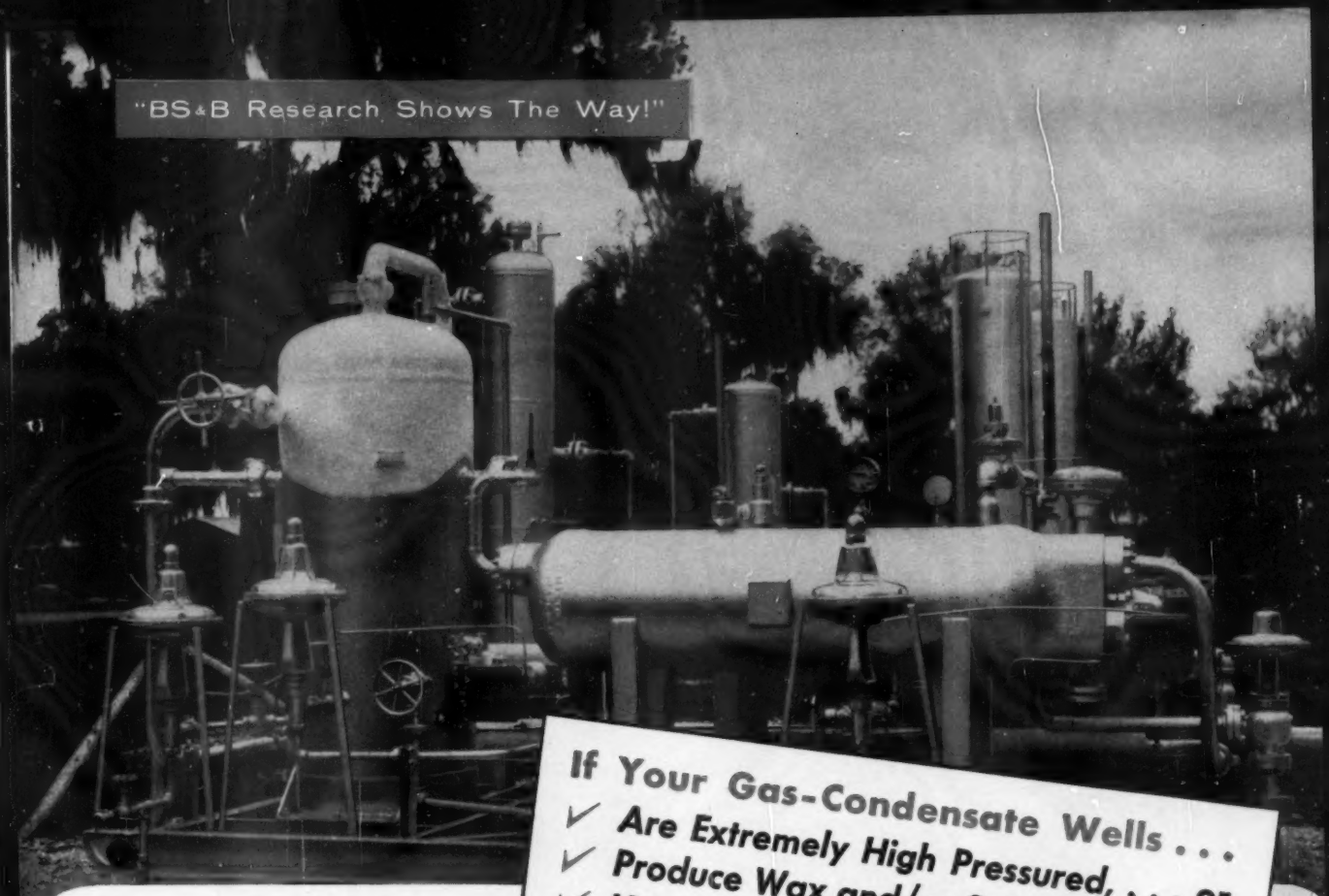

If Your Gas-Condensate Wells . . .
- ✓ **Are Extremely High Pressured, . . . or**
- ✓ **Produce Wax and/or Salt Water, . . . or**
- ✓ **Have A Pressure Life of 3 to 5 Years . . .**

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IF the wellhead pressure of your gas-condensate wells is 3,000 psi or more, a BS&B Model MDH COLD-FRAC System will probably give condensate recoveries comparable with other much more elaborate low temperature separation systems. Specially designed heat exchanger achieves maximum cooling with minimum pressure drop through counterflow with cold sales gas.

IF your wells are producing wax and/or salt water, a BS&B Model MDH COLD-FRAC System, with its highly efficient Model DC Liquid Knockout, will effectively remove particles 10 microns in size or larger. This inlet knockout handles the maximum rated gas capacity without carryover while handling a normal volume of liquid. Waxy oils and salt water are efficiently removed and bypassed around the heat exchanger and choke.

IF your wells have a pressure life of 3 to 5 years, a BS&B Model MDH COLD-FRAC System will normally maintain the proper balance between initial cost and added recovery. More than 60 standard sizes are available from which to select the unit best suited to your requirements.

See Your BS&B Salesman For Detailed Information On BS&B COLD-FRAC Systems — Or Write To...

Other Types Of BS&B COLD-FRAC Systems...

ECON-O-MAX—for economical application of low temperature separation to small gas-condensate wells.

Model GDH—(with hydrate inhibitor) for maximum condensate recovery from wells having a pressure life of more than 5 years.

Gasoline Plants—for lease location or for central gathering stations.

Ammonia Absorption Refrigeration Units—for producing and maintaining temperatures below zero from energy supplied from natural gas fuel.

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